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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

C #1

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OPERATOR'S MANUAL
RADIO SET AN/GRR-7

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NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.
USAR: None.
For explanation of abbreviations used, see AR 320–50.

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TABLE OF CONTENTS

Paragraph	Title	Page
	SECTION I. GENERAL DESCRIPTION	
1-1	General	1
1-7	Theory of Operation	1
1-9	Components Required	1
	SECTION II. OPERATING PROCEDURE	
2-1	Initial Adjustments	4
2-3	Calculating Crystal Frequency of Y501	4
2-4	Crystal Placement	4
2-5	Tuning First Oscillator Section	4
2-6	Tuning RF Section	4
2-7	Front Panel Adjustments	5
2-8	Squelch Operation	5
	SECTION III. OPERATING CHECKS AND ADJUSTMENTS	
3-1	Operating Checks	5
3-3	Retuning Adjustments	5
3-5	Retuning First Oscillator Section	5
3-6	Retuning RF Section	5
	SECTION IV. EMERGENCY OPERATION AND REPAIR	
4-1	General	7
4-3	Checks to make if pilot light is out and no sound can be heard	7
4-4	Checks to make if pilot light is on and no sound can be heard	7
4-5	Method of Checking Crystals	7

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Radio Receiver R-361/GR	ii
1-2	Antenna Assembly AT-197/GR, Disassembled for Shipment	ii
2-1	Radio Receiver R-361/GR, Front View	3
3-1	Radio Receiver R-361/GR, Oscillator and RF Sections, Dust Cover Removed	6
4-1	Radio Receiver R-361/GR, Top View, Dust Cover Removed	8
4-2	Radio Receiver R-361/GR, Power Supply Section, Dust Cover Removed	9
4-3	Radio Receiver R-361/GR, Rear View, Dust Cover Removed	10
4-4	Radio Receiver R-361/GR, Crystal Y501 and Oven A501 Assembly	11

LIST OF TABLES

Table	Title	Page
1-1	Equipment Supplied	1
1-2	Equipment Required but Not Supplied	2

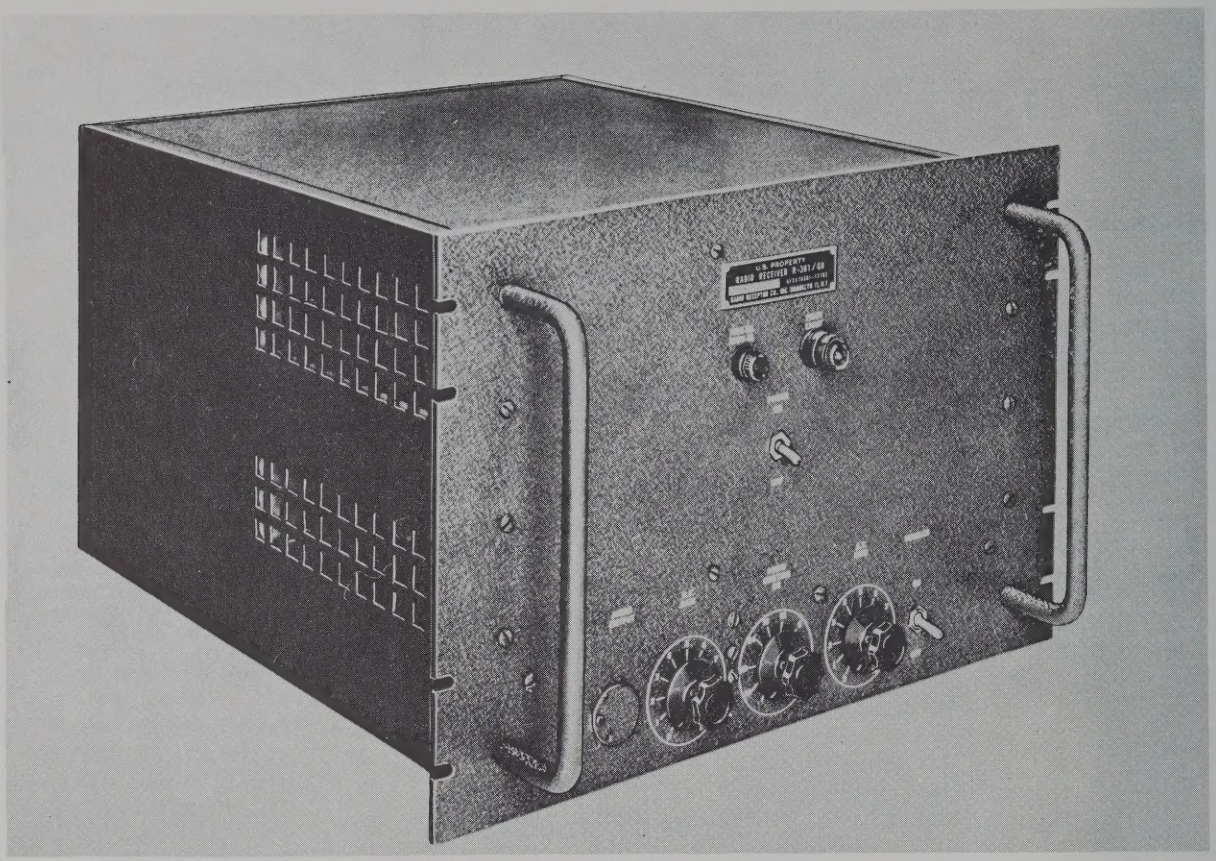

Figure 1-1. Radio Receiver R-361/GR

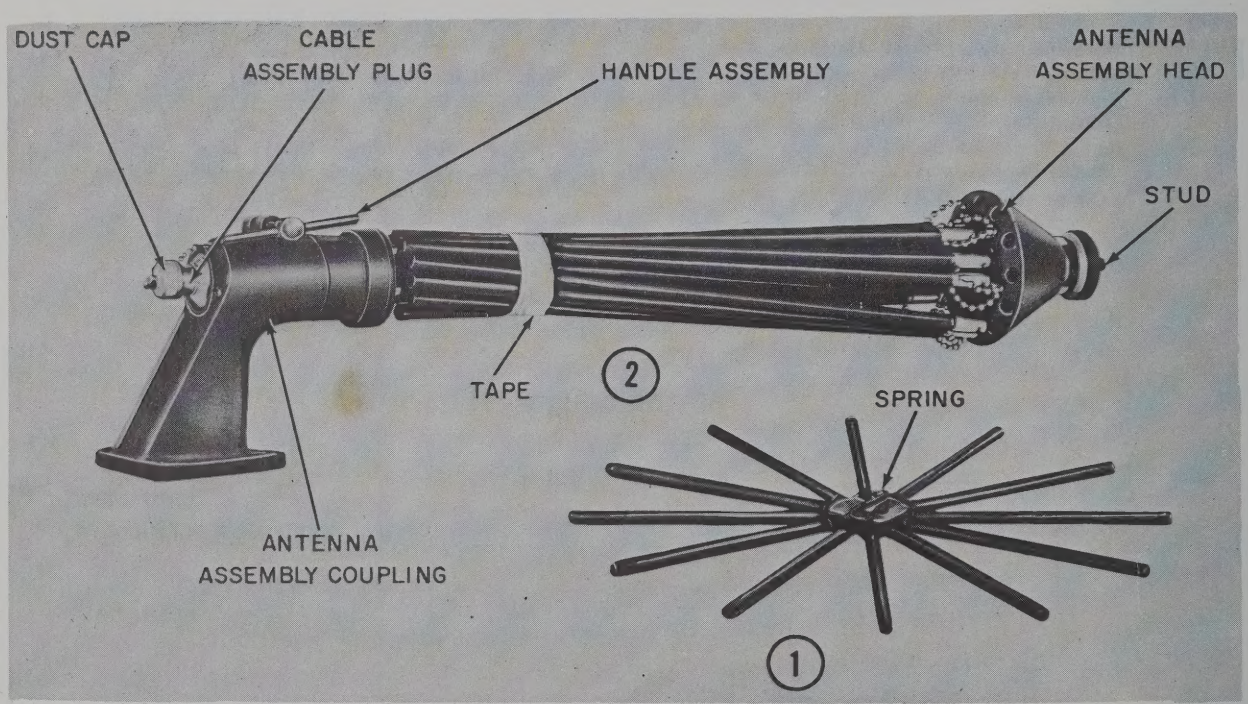

Figure 1-2. Antenna Assembly AT-197/GR, Disassembled for Shipment

SECTION I

DESCRIPTION

1-1. GENERAL.

1-2. The equipment described in this handbook is designated as Radio Receiver R-361/GR, a component part of Radio Receiving Set AN/GRR-7, and Antenna Assembly AT-197/GR, required but not supplied with Radio Receiving Set AN/GRR-7.

1-3. Radio Receiver R-361/GR is a single channel ground UHF receiver, which covers the frequency range from 225 to 399.9 mc. This receiver is designed for single channel operation, and can be used for reception of either voice or tone amplitude modulated signals. It is intended for installation in control towers and airway stations of the USAF.

1-4. When used in conjunction with Modulator-Power Supply MD-141/GR and Transmitter T-282/GR, or an equivalent transmitting equipment, Radio Receiver R-361/GR is capable of establishing two-way radio communication with aircraft equipped with Radio Set AN/ARC-33, or other similar airborne radio sets. Radio Receiver R-361/GR may also be used for two-way radio communication with other UHF ground communication radio sets.

1-5. This equipment will operate satisfactorily on continuous duty at temperatures ranging from -29°C (-20°F) to +55°C (+131°F).

1-6. Radio Receiver R-361/GR can be tuned to individual channels spaced 100 kc apart in the UHF band, extending from 225 mc to 399.9 mc inclusive. Tuning is accomplished by changing the oscillator crystal and retuning the RF (radio frequency) and oscillator sections. (For details see paragraph 3-3.)

1-6A. Antenna Assembly AT-197/GR, is a disc-cone antenna with 12 radially-extending lower radiator assemblies (figure 1-2). The upper radiator assembly (1, figure 1-2) forms a disc, and the antenna assembly head forms a cone. The 12 lower radiator assemblies are dismountable from the head for shipment and are chained to the head to prevent loss after dismounting. This feature decreases the surface area of the antenna assembly and reduces its wind resistance. The antenna assembly weighs 6 pounds net and measures 19 inches (maximum diameter) by 27 inches (length). It has a frequency range of 225-400 megacycles; a power rating of 1000 watts, 100 percent modulation; a radiation pattern which is circular within 1/2 db a nominal impedance of 52 ohms; a maximum standing wave ratio of 1.6:1. Polarization is vertical (E plane). An antenna coupling assembly (figure 1-2) is furnished as a base bracket to mount the antenna.

1-7. THEORY OF OPERATION.

1-8. Radio Receiver R-361/GR is a double superheterodyne receiver utilizing two crystal controlled oscillators. There are two IF (intermediate frequency) sections, the first of which is 40.4 mc and the second is 6 mc. In each case, the oscillator frequency is below the desired signal frequency. The receiver circuitry incorporates AVC (automatic volume control) action, a series noise limiter and squelch circuits. It is capable of delivering one watt of audio power to a 600-ohm load. This receiver utilizes a full-wave rectifier power supply.

1-9. COMPONENTS REQUIRED.

1-10. See Table 1-1 for equipment which is supplied. In order for Radio Receiver R-361/GR to operate satisfactorily, additional apparatus to that supplied is required. Table 1-2 lists the equipment which is required but not supplied.

TABLE 1-1. EQUIPMENT SUPPLIED

QUANTITY	NAME OF UNIT	GOVT TYPE DESIGNATION	DESCRIPTION
1	Radio Receiver	R-361/GR	Complete with tubes and one crystal for second oscillator.
1	Socket Screw Key*		#6 Multiple-spline
1	Socket Screw Key**		#10 Multiple-spline
1	Resistor	RC20BF681K	680 ohms ± 10%, 1/2w

* For location see figure 4-3. This is used to adjust the knobs on the RF and oscillator chassis.

** For location see figure 4-3. This is used to adjust the knobs on the front panel.

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY	NAME OF UNIT	GOVT TYPE DESIGNATION	DESCRIPTION
1	Antenna	AT-197/GR or AS-505/GR	For receiver or transmitter.
1	Antenna Cable	CG-597/U	RF transmission line.
1	Set of Crystals	CR-32/U	For first oscillator section. Frequency range: 20.511111 mc to 39.955556 mc.
1	Power Cable	CX-1541/U	AC power line.
1	DC Voltmeter		Hewlett-Packard #400C or equivalent.
1	Signal Generator		Hewlett-Packard #608A or equivalent.
1	Speaker and/or		Permanent magnet, 600 ohm, complete with plug PL-55,
1	Pair of Headphones		
1	Mounting Rack	MT-686/GR	Equipment mounting.
1	Muting Cable		Muting connection to transmitter.

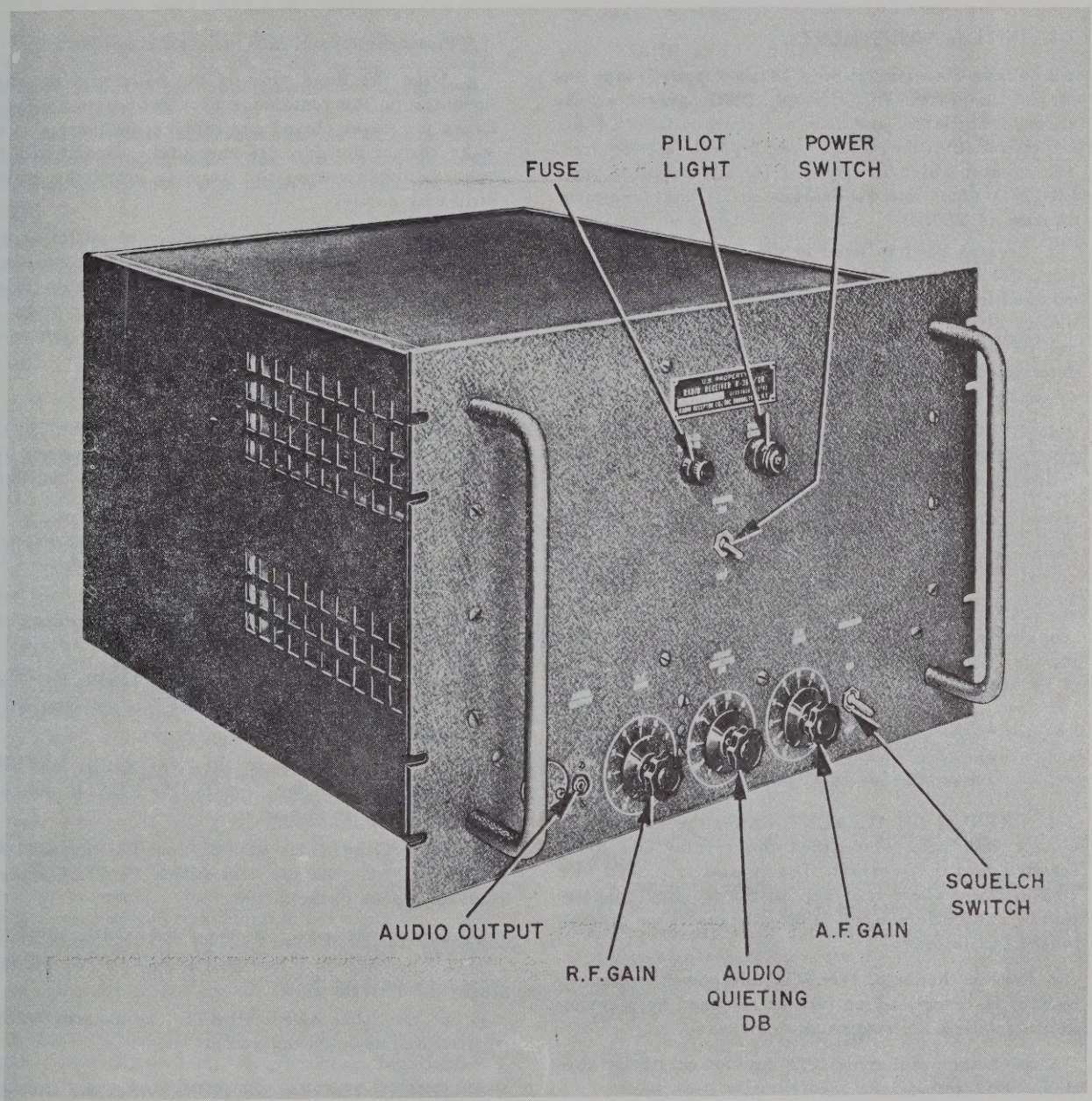

Figure 2-1. Radio Receiver R-361/GR, Front View

SECTION II

OPERATING PROCEDURE

2-1. INITIAL ADJUSTMENTS.

2-2. Radio Receiver R-361/GR is supplied with one crystal in place. This crystal, Y502, serves as the second oscillator, and has a frequency of 34.4 mc. For operation of the receiver, two crystals are required. The crystal which is required but not supplied, is a CR-32/U type, and is designated on the schematic diagram as Y501.

a. Crystal Y501 is used in the first oscillator section. For better stability of operation, this crystal is mounted in a crystal oven when in actual use. The frequency of this crystal depends upon the required channel frequency. After the channel frequency has been determined, it is necessary to find the crystal frequency for the particular channel selected.

2-3. CALCULATING CRYSTAL FREQUENCY OF Y501.--The crystal frequency is found by applying the following equation:

$$\text{crystal frequency (mc)} = \frac{1}{9}(\text{channel frequency (mc)} - 40.4\text{ mc})$$

Sample calculation: Assume that the receiver is required to receive a channel frequency of 260.2 mc. What crystal frequency must be used?

a. Applying the equation given above, and substituting the given values, we obtain:

$$\text{crystal frequency} = \frac{1}{9}(260.2 - 40.4)$$

$$\text{crystal frequency} = \frac{219.8}{9}$$

crystal frequency = 24.422222 mc Answer.

2-4. CRYSTAL PLACEMENT.-- After the correct frequency has been determined the crystal has to be inserted into the receiver. The crystal is placed in a crystal oven, where it is kept at the required temperature by automatic control. In order to insert the crystal, proceed as follows:

a. Remove the dust cover. The dust cover is secured by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

b. Locate crystal oven A501 in the oscillator section. (See figure 3-1.)

c. Remove three screws at the bottom of the oven.

d. Hold the base of the oven with one hand, and pull off the cover with the other hand.

e. Grasp the black bakelite base of the heating element and thermostat assembly, and pull straight out. An HC-6/U type crystal holder is now exposed and may be removed. (See figure 4-4.)

f. Insert the crystal into the crystal holder.

g. Align the three pins on the base with the three openings on the resistance and thermostat assembly. Press the cover closed and replace the three screws. Make certain the cover is absolutely aligned with the base before securing the screws, since the screws strip very easily.

h. The next step in the procedure of initial adjustments requires the alignment of the first oscillator and RF sections. Connect the antenna cable to the antenna directly or the antenna switch-over relay, as the case may be. Connect a line cord to the power outlet. Turn the "POWER" switch to "ON".

2-5. TUNING THE FIRST OSCILLATOR SECTION. (See figure 3-1.) -- After the operating frequency has been set, it is necessary to tune the first oscillator section as follows:

a. Set all tuning dials, indicated below, to approximately the correct frequency. Refer to figure 4-3 for the location of the tuning dials.

b. Using a high impedance DC voltmeter proceed in this manner:

c. Connect the meter to the "1st TRIPL METER" jack J501, and tune the "1st OSC" adjustment for a peak in the meter.

d. Connect the meter to the "1st AMPL METER" jack J502, and tune the "1st TRIPL PLATE" adjustment for a peak in the meter.

e. Connect the meter to the "2nd TRIPL METER" jack J503, and tune the "1st AMPL PLATE" adjustment for a peak in the meter.

f. Connect the meter to the "2nd AMPL METER" jack J504, and tune the "2nd TRIPL PLATE" adjustment for a peak in the meter.

g. Set the "2nd AMPL PLATE" adjustment to the desired frequency on the scale.

2-6. TUNING THE RF SECTION. -- After the first oscillator section has been tuned, it is necessary to tune the RF section. This may be accomplished as follows:

a. Set all the tuning dials to approximately the correct frequency. For the location of the tuning dials see figure 4-3.

b. Connect a high impedance DC voltmeter to the "AVC METER" jack J303.

c. Feed a signal of desired frequency from a transmitter or signal generator into the "ANT. INPUT" jack J401.

CAUTION

Limit the strength of the signal to a maximum of one volt, when using a transmitter.

d. Adjust the "ANT.", "1st RF PLATE", "2nd RF PLATE" and "3rd RF PLATE" tuning adjustments to approximately the proper frequency, as set on the tuning dials.

e. Make a final adjustment on the four controls in step "*d*" above, and the "2nd AMPL PLATE" tuning adjustment, by noting a peak in the reading of the meter.

2-7. FRONT PANEL ADJUSTMENTS. (See figure 2-1 for location of front panel controls.)--After the foregoing alignments have been completed, make the following dial adjustments:

a. Turn the "SQUELCH" switch to the "OFF" position.

b. Turn the "R.F. GAIN" control to the maximum clockwise position.

c. If nothing is heard in the speaker, advance the "A.F. GAIN" control clockwise until either noise or a signal is heard. If no output is obtained from the receiver, refer to paragraph 3-2 of this handbook for necessary checks.

2-8. SQUELCH OPERATION.

a. With no signal and only set noise coming through the speaker, throw the "SQUELCH" switch to the "ON" position.

b. Set the "AUDIO QUIETING" control for 30 db of quieting.

c. Turn the "R.F. GAIN" control counterclockwise until no sound is heard in the speaker.

d. Adjust the "AUDIO QUIETING" control until noise is barely perceptible.

SPECIAL NOTICE

To stop the equipment in an emergency, throw the "POWER" switch to "OFF".

SECTION III
OPERATING CHECKS AND ADJUSTMENTS

3-1. OPERATING CHECKS.

3-2. After making the necessary initial adjustments, if neither signal or noise can be heard, check the following:

a. Check for line voltage failure. Inspect the fuse. If the fuse has blown, replace it with one of the correct value. A 2 amp fuse is used for 115V operation, and a 1 amp fuse is required for 230V operation.

b. Check the antenna cable at J401 to verify that it is connected. The position of the antenna input is shown on figure 4-3.

c. Check all tubes. Refer to par. 4-4*a* through 4-4*g*.

3-3. RETUNING ADJUSTMENTS. (See figure 3-1.)

3-4. To change the operating frequency of Radio Receiver R-361/GR, the procedure outlined in par. 3-4 through 3-6, indicated below, should be followed.

a. Remove the dust cover. The dust cover is secured by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

b. Remove crystal Y501 in oven A501, as described in par. 4-7*a* through 4-7*c*.

c. Insert the proper crystal for the desired RF signal frequency.

3-5. RETUNING THE FIRST OSCILLATOR SECTION. (See figure 3-1.)--After the operating frequency has been changed, it is necessary to retune the first oscillator section as follows:

a. Set all tuning dials, indicated below, to approximately the correct frequency. Refer to figure 4-3 for the location of the tuning dials.

b. Using a high impedance DC voltmeter proceed in this manner:

c. Connect the meter to the "1st TRIPL METER" jack J501, and tune the "1st OSC" adjustment for a peak in the meter.

d. Connect the meter to the "1st AMPL METER" jack J502, and tune the "1st TRIPL PLATE" adjustment for a peak in the meter.

e. Connect the meter to the "2nd TRIPL METER" jack J503, and tune the "1st AMPL PLATE" adjustment for a peak in the meter.

f. Connect the meter to the "2nd AMPL METER" jack J504, and tune the "2nd TRIPL PLATE" adjustment for a peak in the meter.

g. Set the "2nd AMPL PLATE" adjustment to the desired frequency on the scale.

3-6. RETUNING THE RF SECTION.--After the first oscillator section has been retuned, it is necessary to retune the RF section. This may be accomplished as follows:

a. Set all the tuning dials to approximately the correct frequency.

b. Connect a high impedance DC voltmeter to the "AVC METER" jack J303 (see figure 4-1).

c. Feed a signal of desired frequency from a transmitter or signal generator into the "ANT. INPUT" jack J401 (see figure 4-3).

CAUTION

Limit the strength of the signal to a maximum of one volt, when using a transmitter.

d. Adjust the "ANT.", "1st RF PLATE", "2nd RF PLATE" and "3rd RF PLATE" tuning adjustments to approximately the proper frequency, as set on the tuning dials.

e. Make a final adjustment on the four controls in step "*d*" above, and the "2nd AMPL PLATE" tuning adjustment, by noting a peak in the reading of the meter.

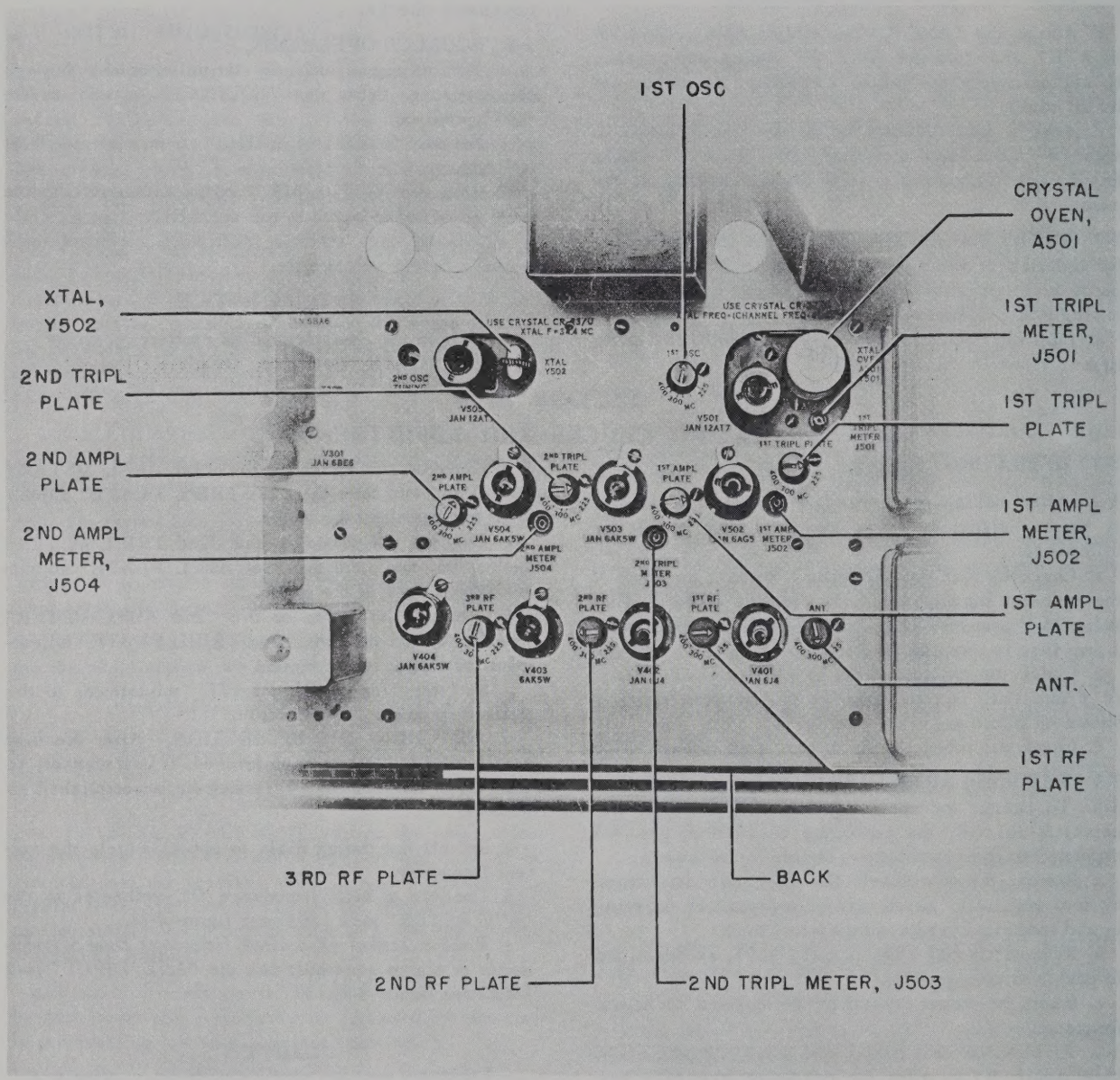

Figure 3-1. Radio Receiver R-361/GR, Oscillator and RF Sections, Dust Cover Removed

SECTION IV

EMERGENCY OPERATION AND REPAIR

4-1. GENERAL.

4-2. If no audio output is obtained from this equipment, the operator should make the following checks in the sequence given below. Each step indicated presupposes satisfactory completion of all previous steps.

4-3. CHECKS TO MAKE IF THE PILOT LIGHT IS OUT AND NO SOUND CAN BE HEARD.

a. Examine the pilot light. If the bulb is defective, replace it. If the pilot light remains unlit and no sound can be heard, see "*b*" below.

b. Examine the fuse. This equipment contains one fuse located on the front panel and accessible from the front. For 115V operation, the correct fuse rating is 2 amp. For 230V operation, a 1 amp rated fuse should be used. Replace a blown fuse with one of the correct value. If the pilot light still remains out and no sound can be heard in the speaker, see "*c*" below.

c. Check the following connections at the rear of the chassis for proper mechanical and electrical assembly: "POWER" J302, "ANT. INPUT" J401, and "MUTING" on terminal board E303. The location of these connections is shown on figure 4-3. If this check does not reveal any faults and the pilot light remains out and no sound can be heard, the set requires servicing by maintenance personnel.

4-4. CHECKS TO MAKE IF THE PILOT LIGHT IS ON AND NO SOUND CAN BE HEARD.

a. Check the tubes. In order to inspect the tubes, it is first necessary to disconnect all cables and remove the dust cover. After the dust cover has been removed, reconnect all cables. The power is now turned on.

WARNING

Line voltage exists on the rear of the front panel. Take all possible precautions to avoid injury, while inspecting the interior of the equipment.

b. Examine each tube to see if it is lit. Remove any tube which shows no light.

WARNING

With the power turned on, the tubes will become hot. Exercise care while working inside the equipment.

c. All miniature tubes in this equipment, with the exception of V309, are covered by a metal shield. To remove the shield, press down gently and turn counterclockwise 1/8th of a turn, then lift off. If the tube does not release easily, rock it slightly and then pull upward. Label each tube as soon as it is removed, so it can be replaced in its proper socket.

d. V309 (figure 4-1) is a miniature tube which is held in place by a Birtcher clamp. In order to extract this tube, raise the lid of the clamp and turn 90 degrees.

e. Tubes V311 and V312 are located on the main chassis and can only be reached from the side of the rack. The location of these tubes is shown in figure 4-2. V311 and V312 are held in position by retainer rings. These rings can be removed by placing the index finger on top of the threaded rod, and the thumb on the outer edge of the ring tab. By pressing the thumb and index finger together, the retainer will come off. To replace the retainer ring, place the hole in the tab over the screw and apply pressure downward at the spot where the tab joins the ring. Continue exerting pressure until the ring fits snugly over the tube.

f. If after replacing any unlit tubes no sound can be heard, replace each tube in the equipment, with a new one known to be alright. Proceed in the task by replacing only one tube at a time. Make certain the replacement tube is in its socket before another tube is removed. By following this procedure, the possibility of misplacing a tube will be eliminated.

g. If no sound can be heard after replacing all the tubes, check the crystals.

4-5. METHOD OF CHECKING CRYSTALS.

4-6. There are two crystals in this equipment designated as Y501 and Y502. Both crystals are located in the oscillator section (figure 3-1) and may be checked by utilizing a set-up as described in paragraph 3-5, and observing the meter reading. If no peak can be noted on the meter, examine the crystal Y501. Figure 4-4 shows crystal Y501 in oven A501.

4-7. Crystal Y501 is contained in an oven A501. The crystal may be removed from the oven as described below:

a. Remove three screws at the bottom of the oven.

b. Hold the base of the oven with one hand and pull off the cover with the other hand.

c. Grasp the black bakelite base of the heating element and thermostat assembly, and pull straight out. The crystal, held in a HC-6/U type holder, is now exposed and may be removed.

d. Replace the crystal with another one of the same frequency.

e. After replacing the crystal, align the three pins on the base with the three openings on the resistance and thermostat assembly. Press the cover closed and replace the three screws. Make certain the cover is absolutely aligned with the base before securing the screws, since the screws strip very easily.

f. Try to retune the first oscillator. Refer to paragraph 3-5.

g. If a peak is noted on the meter, but the set does not operate, replace the second crystal Y502, with another crystal of the same frequency.

h. Try to retune the second oscillator by connecting the high impedance DC voltmeter to the "AVC METER" jack J303, and tuning the "2nd OSC TUNING" control for a peak in the meter.

4-8. If the set does not operate after making all the above checks, it requires servicing by maintenance personnel.

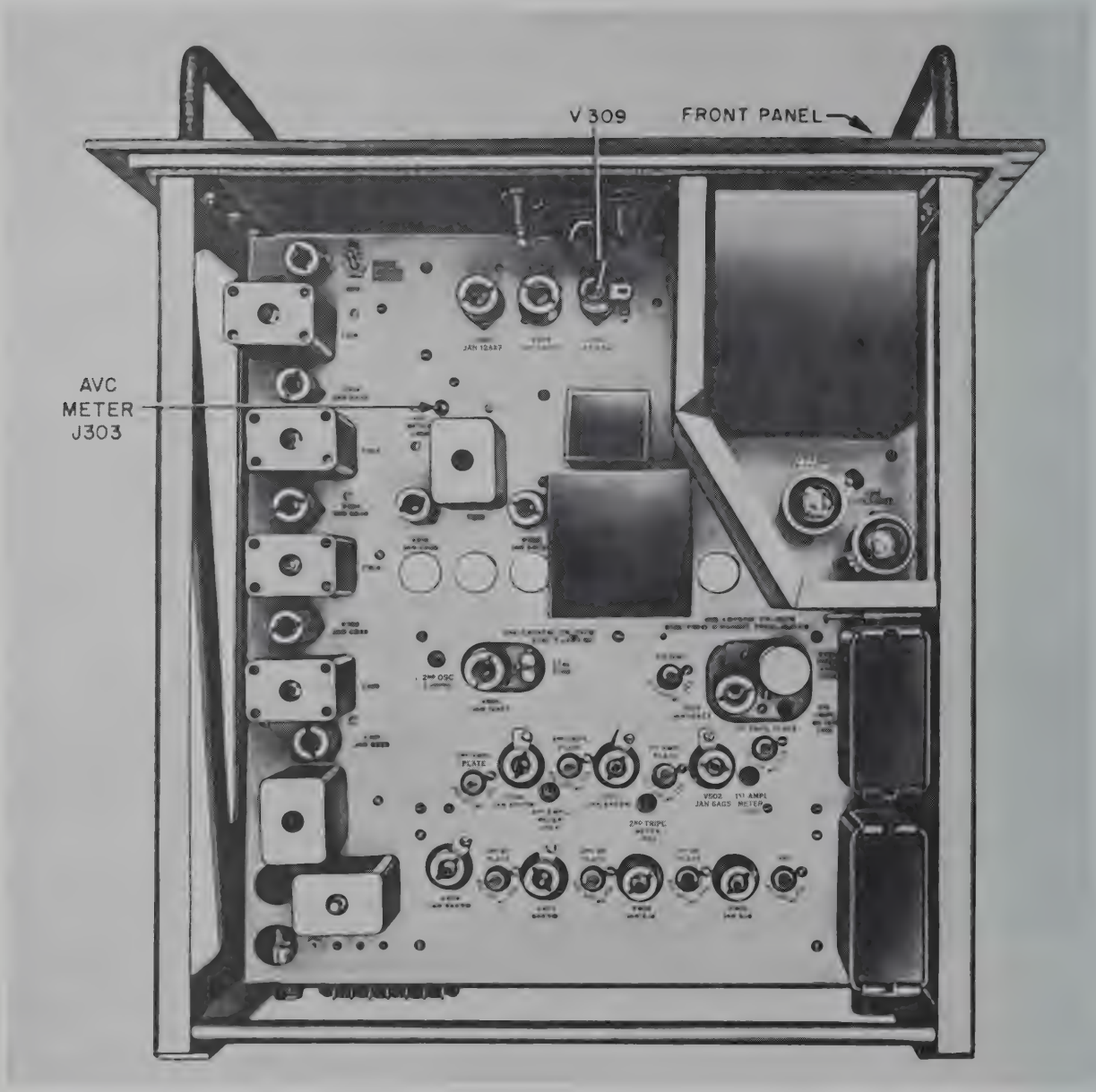

Figure 4-1. Radio Receiver R-361/GR, Top View, Dust Cover Removed

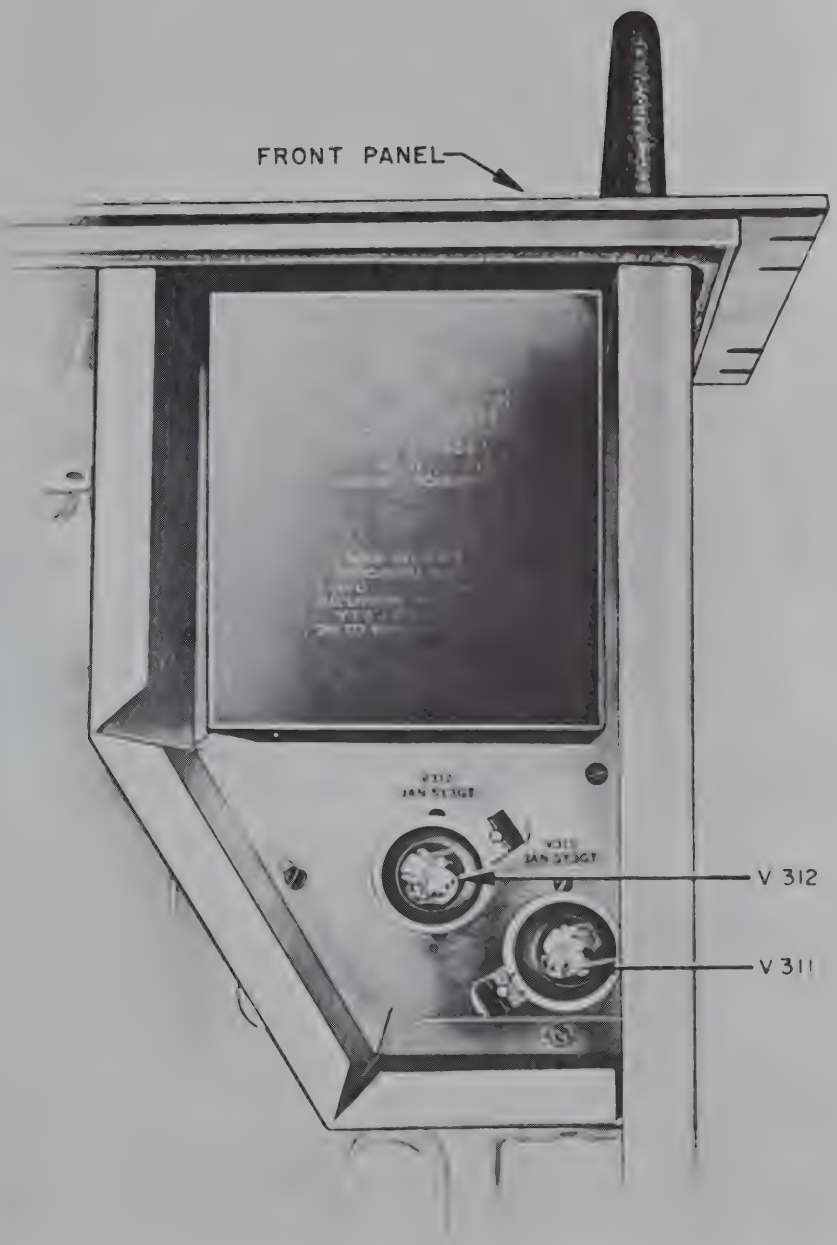

Figure 4-2. Radio Receiver R-361/GR, Power Supply Section, Dust Cover Removed

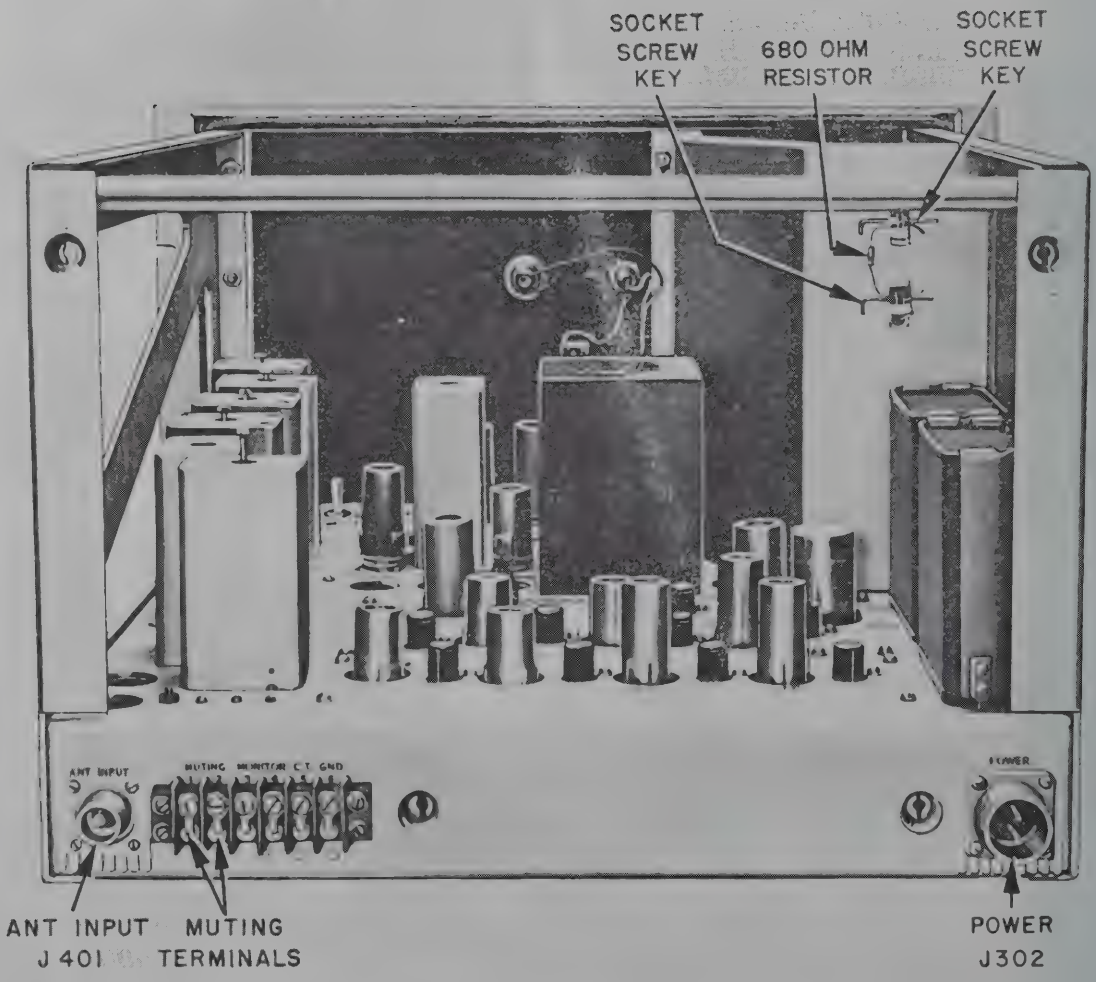

Figure 4-3. Radio Receiver R-361/GR, Rear View, Dust Cover Removed

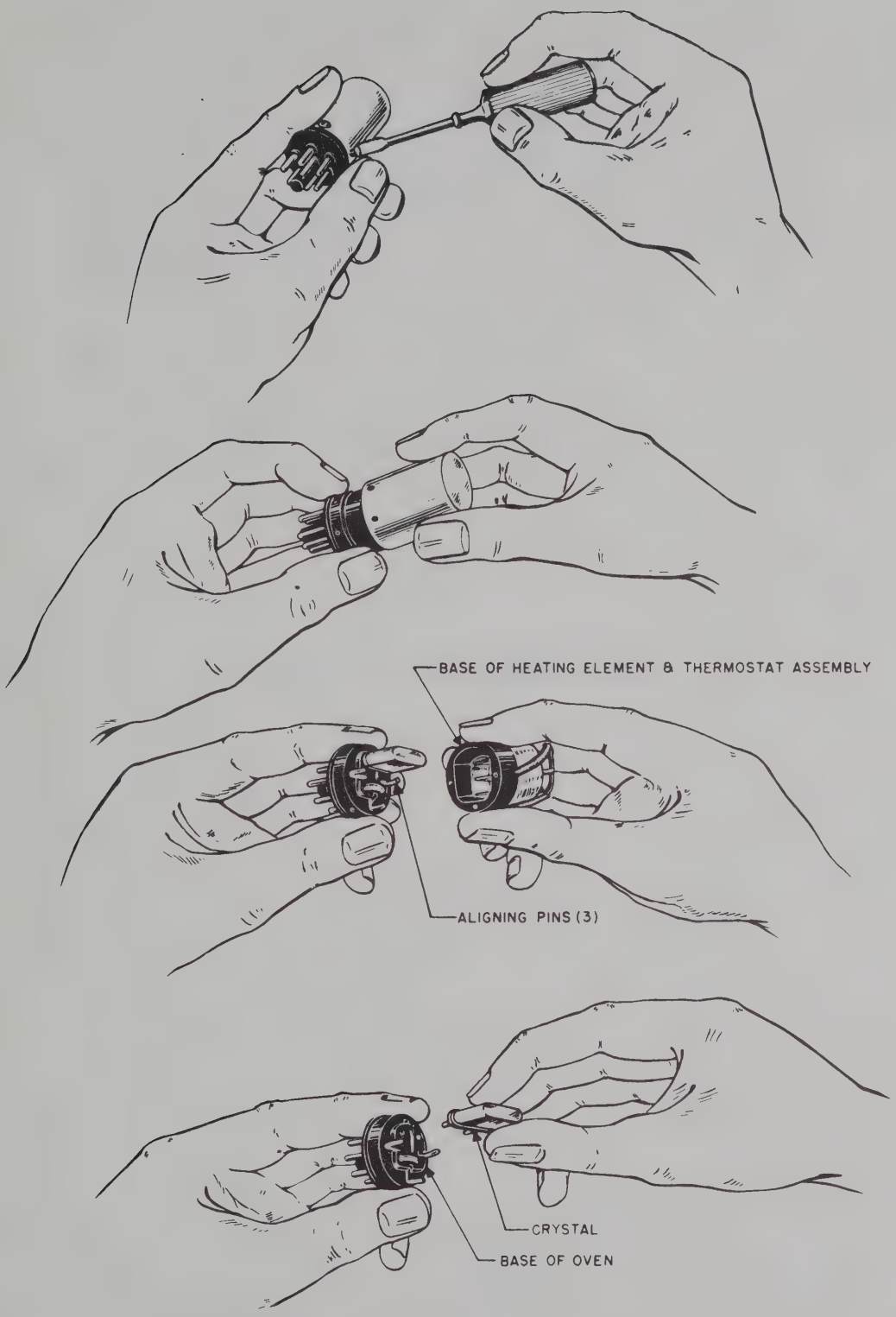

Figure 4-4. Radio Receiver R-361/GR, Crystal Y501 and Oven A501 Assembly

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CONTENTS

Number	Title	Page
1.1(6)	Power Supply	1
1.2(6)	Over-all Receiver Alignment	3
1.3(8)	Intermediate-Frequency Center Frequency	5
1.4(6)	Squelch Circuit	7
1.5(2)	Over-all Receiver Sensitivity	9
1.6(8)	Image-Frequency Rejection	11-12
1.7(15)	A-V-C Circuit	13
1.8(9)	Audio Power Output	15
2.1(5)	Initial Adjustments	17
2.2(5)	I-F, A-V-C, and Second-Oscillator Alignment	21
2.3(5)	Crystals	25
3.1(1)	Cleaning and Inspection of Radio Receiver R-361/GR	29
3.2(1)	Cleaning and Inspection of Antenna Assembly AT-197/GR	31

INTRODUCTION

1. PURPOSE: This handbook establishes standardized work methods and simplified step-by-step job instructions for the preventive maintenance of Radio Set AN/GRR-7 and Antenna Assembly AT-197/GR. The individual job instructions, in the form of "Routines," are presented simply and logically to permit their ready use by maintenance personnel. Adequate performance standards are included.

2. SCOPE: These job instructions are applicable to and will be utilized by all activities maintaining the equipment.

3. SPECIAL INSTRUCTIONS: This handbook will be utilized as a portion of the standardized communications electronics maintenance inspection system. Personnel utilizing this handbook shall notify supervisory personnel immediately if satisfactory performance cannot be obtained.

SCHEDULE FOR ACCOMPLISHMENT OF ROUTINES

(Intervals are in days; for example "7" means "every seventh day")

Routine Number	CONTINUOUS OPERATION				TACTICAL OPERATION				STANDBY OPERATION			
	Temperate	Arctic	Tropic	Desert	Temperate	Arctic	Tropic	Desert	Temperate	Arctic	Tropic	Desert
1.1(6)	*	*	*	*	*	*	*	*	*	*	*	*
1.2(6)	*	*	*	*	*	*	*	*	*	*	*	*
1.3(8)	*	*	*	*	*	*	*	*	*	*	*	*
1.4(6)	*	*	*	*	*	*	*	*	*	*	*	*
1.5(2)	45	45	30	20	45	45	30	20	45	45	30	20
1.6(8)	*	*	*	*	*	*	*	*	*	*	*	*
1.7(15)	*	*	*	*	*	*	*	*	*	*	*	*
1.8(9)	*	*	*	*	*	*	*	*	*	*	*	*
2.1(5)	*	*	*	*	*	*	*	*	*	*	*	*
2.2(5)	*	*	*	*	*	*	*	*	*	*	*	*
2.3(5)	*	*	*	*	*	*	*	*	*	*	*	*
3.1(1)	60	60	45	30	60	60	45	30	60	60	45	30
3.2(1)	180	180	90	90	180	180	90	90	180	180	90	90

* Accomplishment to be directed by maintenance supervisor when results of performance tests indicate the need therefor.

PERFORMANCE TEST—POWER SUPPLY

1. GENERAL INFORMATION.

a. The purpose of this routine is to determine whether the line voltage and power-supply output voltage are normal.

b. The approximate time required for this routine is 30 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Multimeter AN/PSM-6.

3. MATERIALS REQUIRED.

a. Screwdriver.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect all cables at rear of equipment.

c. Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

d. If underside of chassis is inaccessible for meter connections, remove receiver rack mounting screws and move equipment to service bench. Set receiver upside down, with rear of chassis at front of bench.

e. Set FUNCTION switch of multimeter to ACV-1KΩ/V position, and RANGE switch to 500-volt position.

f. Connect one test lead from black jack of multimeter to center tab of C345, on POWER input jack J302.

g. Connect another lead from red jack of multimeter to center tab of C346, on POWER input jack J302.

h. Reconnect a-c power cable.

WARNING

LINE VOLTAGE EXISTS IN THE E-
QUIPMENT.

i. Set POWER switch to ON position.

j. Observe indication on multimeter. The indication should be 115 ±10 volts or 230 ±20 volts, depending on the line voltage used.

WARNING

DO NOT TOUCH THE TEST LEAD CON-
NECTIONS UNTIL THE A-C POWER
CABLE IS DISCONNECTED.

k. Set POWER switch to OFF position.

l. Disconnect a-c power cable.

m. Disconnect test leads of multimeter.

n. Set FUNCTION switch of multimeter to DCV-1KΩ/V position and RANGE switch to 500-volt position.

o. Connect one test lead from red jack of multimeter to high potential side of C348 (terminal with red lead) which is located at bottom left center of chassis.

p. Connect another lead from black jack of multimeter to receiver chassis (ground).

q. Reconnect a-c power cable.

r. Set POWER switch to ON position.

s. Observe multimeter indication. The indication should be 205 ±5 volts.

t. Set POWER switch to OFF position.

u. Disconnect a-c power cable.

v. Disconnect test leads of multimeter.

w. If the following tests are not to be performed, replace dust cover, remount receiver in rack, and reconnect cables at rear of equipment.

PERFORMANCE TEST—OVER-ALL RECEIVER ALIGNMENT

1. GENERAL INFORMATION.

a. The purpose of this routine is to check the over-all alignment of the receiver.

b. The approximate time required for this routine is 45 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Electronic Multimeter TS-505/U.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Screwdriver.

c. Test jumper with alligator clips.

d. Connector, UG-213A/U.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect all cables at rear of equipment.

c. Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

d. If underside of chassis is inaccessible for meter connections, remove receiver rack mounting screws and move equipment to service bench. Set receiver upside down, with rear of chassis at front of bench.

e. Reconnect a-c power cable.

f. Set receiver switches and controls as follows:

R.F. GAIN	Fully counterclockwise
AUDIO QUIETING DB	Fully counterclockwise
A.F. GAIN	Fully counterclockwise
SQUELCH	OFF
NOISE LIMITER SWITCH	OFF

g. Disable a-v-c circuit by connecting test jumper from junction of R342, R343, and C331, located at bottom front center of chassis, to receiver chassis (ground).

h. Plug headset into AUDIO OUTPUT jack on front panel.

i. Connect impedance-matching pad, supplied with signal generator, to CARRIER OUTPUT jack of signal generator.

j. Adjust signal-generator controls as follows:

(1) Set POWER switch to ON position.

(2) Set EXT. PULSE switch to OFF position.

(3) Set modulation selector switch to OFF position.

(4) Rotate range knob to band correct for receiver operating frequency.

(5) Rotate tuning dial to receiver operating frequency.

(6) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(7) Set modulation selector switch to 1000 position.

(8) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

(9) Adjust carrier output attenuator fully counterclockwise.

k. Connect one end of cord CG-55/U, supplied with signal generator, to attenuator pad. Connect other end to ANT. INPUT jack (J401) at rear of receiver, using connector UG-213A/U.

l. Set FUNCTION switch of electronic multimeter to —DC position, and RANGE switch to 10V position.

m. Connect a test lead from COMMON post of electronic multimeter to receiver chassis (ground).

n. Connect d-c probe to junction of R325 and S303, located at bottom right front of chassis.

o. Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making any tests.

p. Adjust carrier output attenuator of signal generator to 3 microvolts, using PAD mark on fiducial ring as a reference.

q. Turn R.F. GAIN control fully clockwise.

r. Observe indication on electronic multimeter. Adjust signal generator tuning dial until multimeter indicates a peak. The indication should be between 1.5 and 8 volts depending upon frequency used.

s. Set POWER switch of receiver to OFF position.

t. Disconnect test equipment.

u. Remove short across a-v-c circuit.

v. If following tests are not to be performed, replace dust cover, remount receiver in rack, and reconnect cables at rear of equipment.

PERFORMANCE TEST-INTERMEDIATE-FREQUENCY CENTER FREQUENCY

1. GENERAL INFORMATION.

a. The purpose of this routine is to check the intermediate-frequency center frequency of the receiver.

b. The approximate time required for this routine is 60 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Electronic Multimeter TS-505/U.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Screwdriver.

c. Test jumper with alligator clips.

d. 0.05-μf capacitor.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect all cables at rear of equipment.

c. Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

d. If underside of chassis is inaccessible for meter connections, remove receiver rack mounting screws and move equipment to service bench. Set receiver upside down, with rear of chassis at front of bench.

e. Reconnect a-c power cable.

f. Set receiver switches and controls as follows:

R.F. GAIN	Fully counterclockwise
AUDIO QUIETING DB	Fully counterclockwise
A.F. GAIN	Fully counterclockwise
SQUELCH	OFF
NOISE LIMITER SWITCH	OFF

g. Disable a-v-c circuit by shorting connecting test jumper from junction of R342, R343, and C331, located at bottom front center of chassis, to receiver chassis (ground).

h. Plug headset into AUDIO OUTPUT jack on front panel.

i. Adjust signal-generator controls as follows:

(1) Set POWER switch to ON position.

(2) Set EXT. PULSE switch to OFF position.

(3) Set modulation selector switch to OFF position.

(4) Rotate range knob to band B.

(5) Rotate tuning dial to 6 mc.

(6) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(7) Set modulation selector switch to 1000 position.

(8) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

j. Connect signal generator as follows:

(1) Connect plug connector end of Radio Frequency Cable Assembly CG-683/U, supplied with signal generator, to signal generator.

(2) Connect GND. binding post of cable CG-683/U, using as short a lead as possible, to receiver chassis (ground).

(3) Connect a 0.05-μf capacitor, using as short a lead as possible, to positive binding post of cable CG-683/U.

(4) Connect other end of 0.05-μf capacitor, using as short a lead as possible, to center tab of C351, located at right rear of chassis.

k. Adjust carrier output attenuator of signal generator to 500 microvolts.

l. Set FUNCTION switch of electronic multimeter to —DC position, and RANGE switch to 10V position.

m. Connect a test lead from COMMON post of electronic multimeter to receiver chassis (ground).

n. Connect d-c probe to junction of R325 and S303, located at bottom right front of chassis.

o. Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making any tests.

p. Turn RF GAIN control clockwise until the electronic multimeter indication is one-fourth full scale. Adjust tuning dial of signal generator back and forth across 6-mc point to exact minimum dip between response peaks, as noted on electronic multimeter.

q. Read carrier frequency dial of signal generator; the indication should be 6 mc ±1 kc.

r. Set POWER switch of receiver to OFF position.

s. Disconnect test equipment.

t. Remove short across a-v-c circuit.

u. If following tests are not to be performed, replace dust cover, remount receiver in rack, and reconnect cables at rear of equipment.

PERFORMANCE TEST—SQUELCH CIRCUIT

1. GENERAL INFORMATION.

a. The purpose of this routine is to determine whether the squelch circuit is operating properly.

b. The approximate time required for this routine is 45 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Electronic Multimeter TS-505/U.
b. Signal Generator TS-497( )/URR.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Screwdriver.

c. Connector, UG-213A/U.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect all cables at rear of equipment.

c. Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

d. If underside of chassis is inaccessible for meter connections, remove receiver rack mounting screws and move equipment to service bench. Set receiver upside down, with rear of chassis at front of bench.

e. Reconnect a-c power cable.

f. Plug headset into AUDIO OUTPUT jack on front panel.

g. Connect impedance-matching pad, supplied with signal generator, into CARRIER OUTPUT jack of signal generator.

h. Adjust signal-generator controls as follows:

(1) Set POWER switch to ON position.

(2) Set EXT. PULSE switch to OFF position.

(3) Set modulation selector switch to OFF position.

(4) Rotate range knob to band F.

(5) Rotate tuning dial to receiver operating frequency.

(6) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(7) Set modulation selector switch to 1000 position.

(8) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

(9) Adjust carrier output control fully counterclockwise.

i. Connect one end of cord CG-55B/U, supplied with signal generator, to matching pad. Connect other end of cord to ANT. INPUT jack (J401) of receiver, using connector UG-213A/U.

j. Adjust carrier output attenuator of signal generator to 5 microvolts, using PAD mark on fiducial ring as a reference.

k. Set FUNCTION switch of electronic multimeter to —DC position, and RANGE switch to 10V position.

l. Connect d-c probe of electronic multimeter to pin 2 of squelch amplifier tube V307A, located at bottom front center of chassis.

m. Connect another lead from COMMON post of electronic multimeter to receiver chassis (ground).

n. Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making any tests.

o. Set R.F. GAIN control and AF GAIN control of receiver fully clockwise, and set SQUELCH switch to ON position.

p. Adjust tuning dial of signal generator for a dip between two maximum indications on electronic multimeter.

q. Set R.F. GAIN control fully counterclockwise and then slowly rotate control in a clockwise direction until signal is heard to "pop" into headset.

r. Observe indication on electronic multimeter. The indication should be between 0.6 volt and 1.2 volts at the threshold point.

s. Set POWER switch of receiver to OFF position.

t. Disconnect test equipment.

u. Replace dust cover, remount receiver in rack, and reconnect cables at rear of equipment.

PERFORMANCE TEST—OVER-ALL RECEIVER SENSITIVITY

1. GENERAL INFORMATION.

a. The purpose of this routine is to determine whether the over-all receiver sensitivity is normal at the operating frequency.

b. The approximate time required for this routine is 45 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Multimeter AN/PSM-6.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Connector, UG-213A/U.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect the following:

(1) Antenna coaxial cable located at rear of receiver.

(2) Muting cable (if connected) from MUTING terminals (1 and 2) on terminal board (E303) at rear of receiver.

c. Set receiver switches and controls as follows:

R.F. GAIN	Fully clockwise
AUDIO QUIETING DB	Fully counterclockwise
A.F. GAIN	Fully clockwise
SQUELCH	OFF

d. Plug headset into AUDIO OUTPUT jack on receiver front panel.

e. Connect signal generator as follows:

(1) Connect impedance-matching pad, supplied with signal generator, to CARRIER OUTPUT jack on signal generator.

(2) Connect one end of cord CG-55B/U, supplied with signal generator, to impedance-matching pad. Connect other end of cord to ANT. INPUT jack (J401) of receiver, using connector UG-213A/U.

f. Set signal generator as follows:

(1) Set POWER switch to ON position.

(2) Set EXT. PULSE switch to OFF position.

(3) Set modulation selector switch to OFF position.

(4) Set carrier output attenuator control fully counterclockwise.

(5) Set range knob to band F.

(6) Adjust tuning dial until carrier frequency dial is set to receiver operating frequency.

(7) Adjust ring fiducial control, located behind carrier output attenuator, until OUTPUT meter pointer is on red line.

(8) Set modulation selector switch to 1000 position.

(9) Adjust MOD control until PERCENT MODULATION meter indicates 30.

g. Set function switch of multimeter to ACV-1KΩ/V position, and RANGE switch to 50-volt position.

h. Connect multimeter to MUTING terminals (1 and 2) on terminal board (E303) at rear of receiver.

i. Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making tests.

j. Adjust signal-generator carrier output attenuator to 3 microvolts using the PAD mark as reference.

k. Adjust signal-generator tuning dial until multimeter indicates a peak. The signal generator is now tuned to the receiver frequency.

l. Adjust receiver AF GAIN control to produce a 2.45-volt (10-milliwatt) indication on multimeter. Set RANGE switch of multimeter to 10-volt position to accommodate the 2.45-volt reading.

m. Set signal-generator modulation control to OFF. Set RANGE switch of multimeter to 2.5-volt position.

n. No more than a 0.775-volt (1-milliwatt) indication on the multimeter should be present.

o. Set POWER switch of receiver to OFF position.

p. Unless following test is to be performed, disconnect test equipment.

q. Reconnect antenna and muting cables.

PERFORMANCE TEST—IMAGE-FREQUENCY REJECTION

1. GENERAL INFORMATION.

a. The purpose of this routine is to determine whether the image-rejection ratio of the receiver is normal at the operating frequency.

b. In order to perform this routine, it is first necessary to accomplish Routine 1.5(2), Over-all Receiver Sensitivity. Do not re-adjust receiver AF GAIN after performing routine 1.5(2) in preparation for this routine.

c. The approximate time required for this routine is 45 minutes.

d. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Multimeter AN/PSM-6.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Connector, UG-213A/U.

4. PROCEDURES.

a. Set signal generator to receiver operating frequency.

b. Retune signal generator to image frequency (desired frequency minus two times the 1st i-f frequency). For example, the image frequency of 225 mc is:

225 — (2 x 40.4) = 144.2 mc (image frequency)

c. Increase signal-generator output voltage until multimeter indicates 2.45 volts (10 milliwatts).

d. Read indication of signal-generator output voltage. The signal generator carrier output attenuator should indicate 3000 microvolts or more.

PERFORMANCE TEST—A-V-C CIRCUIT

1. GENERAL INFORMATION.

a. The purpose of this routine is to determine whether the a-v-c circuit is operating properly.

b. The approximate time required for this routine is 30 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Electronic Multimeter TS-505/U.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Screwdriver.

c. Connector, UG-213A/U.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect all cables at rear of equipment.

c. Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

d. Reconnect a-c power cable.

e. Plug headset into AUDIO OUTPUT jack on front panel.

f. Connect impedance-matching pad, supplied with the signal generator, to CARRIER OUTPUT jack of signal generator.

g. Adjust signal-generator controls as follows:

(1) Set POWER switch to ON position.

(2) Set EXT. PULSE switch to OFF position.

(3) Set modulation selector switch to OFF position.

(4) Adjust carrier output attenuator control to fully counterclockwise.

(5) Rotate range knob to band F.

(6) Rotate tuning dial to receiver operating frequency.

(7) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(8) Set modulation selector switch to 1000 position.

(9) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

h. Connect one end of cord CG-55B/U, supplied with signal generator, to matching pad. Connect other end of cord to ANT. INPUT jack (J401) of receiver, using connector UG-213A/U.

i. Set FUNCTION switch of electronic multimeter to —DC position, and RANGE switch to 10V position.

WARNING

LINE VOLTAGE EXISTS ON THE REAR OF THE FRONT PANEL. TAKE ALL POSSIBLE PRECAUTIONS AND EXERCISE CARE WHILE WORKING INSIDE THE EQUIPMENT.

j. Connect d-c probe of electronic multimeter to AVC METER jack (J303), located at top front center of chassis.

k. Connect another lead from COMMON post of electronic multimeter to receiver chassis (ground).

l. Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making tests.

m. Set R.F. GAIN control of receiver to fully clockwise.

n. Adjust carrier output attenuator of signal generator to 5 microvolts, using the PAD mark on the fiducial ring as a reference.

o. Adjust tuning dial of signal generator for a dip between two maximum outputs as indicated on electronic multimeter.

p. Observe indication on electronic multimeter. The indication should be at least 1.5 volts.

q. Set POWER switch to OFF position.

r. Disconnect test equipment.

s. Replace dust cover, and reconnect cables at rear of equipment.

PERFORMANCE TEST—AUDIO POWER OUTPUT

1. GENERAL INFORMATION.

a. The purpose of this routine is to determine whether the audio power output is normal.

b. The approximate time required for this routine is 30 minutes.

c. Report all measurements that are not within tolerance to the maintenance supervisor for corrective action.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Multimeter AN/PSM-6.

3. MATERIALS REQUIRED.

a. Headset CW-49507.

b. Connector, UG-213A/U.

4. PROCEDURES.

a. Set POWER switch of receiver to OFF position.

b. Disconnect the following:

(1) Antenna coaxial cable located at rear of receiver.

(2) Muting cable (if connected) from MUTING terminals (1 and 2) on terminal board (E303) at rear of receiver.

c. Set receiver R.F. GAIN control fully clockwise.

d. Set receiver A.F. GAIN control fully counterclockwise.

e. Plug headset into AUDIO OUTPUT jack on front panel.

f. Connect impedance-matching pad, supplied with signal generator, to CARRIER OUTPUT jack of signal generator.

g. Adjust signal-generator controls as follows:

(1) Set POWER switch to ON position.

(2) Set EXT. PULSE switch to OFF position.

(3) Set modulation selector switch to OFF position.

(4) Set carrier output attenuator fully counterclockwise.

(5) Rotate range knob to band F.

(6) Rotate tuning dial to receiver operating frequency.

(7) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(8) Set modulation selector switch to 1000 position.

(9) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

h. Connect one end of cord CG-55B/U, supplied with signal generator, to pad. Connect other end of cord to ANT. INPUT jack (J401) of receiver, using connector UG-213A/U.

i. Adjust carrier output attenuator of signal generator to 50 microvolts, using the PAD mark on the fiducial ring as a reference.

j. Set FUNCTION switch of multimeter to ACV-1KΩ/V position, and RANGE switch to 50-volt position.

k. Connect multimeter to MUTING terminals (1 and 2) on terminal board (E303) at rear of receiver.

l Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making any tests.

m. Set A.F. GAIN control fully clockwise, and AUDIO QUIETING control fully counterclockwise.

n. Adjust tuning dial of signal generator for a maximum indication on multimeter.

o. Observe indication on multimeter. The indication should be at least 24.5 volts (1 watt).

p. Set modulation selector switch of signal generator to 400 position.

q. Observe indication on multimeter. The indication should be greater than one-half of that obtained in step o.

r. Set POWER switch of receiver to OFF position.

s. Disconnect test equipment.

t. Reconnect cables at rear of equipment.

SERVICING PROCEDURE—INITIAL ADJUSTMENTS

1. GENERAL INFORMATION.

a. The purpose of this routine is to tune the first-oscillator section and the r-f section of the receiver.

b. The approximate time required for this routine is 60 minutes.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Electronic Multimeter TS-505/U.

3. MATERIALS REQUIRED.

a. Screwdriver.

b. Alignment tool.

c. Headset CW-49507.

d. Test jumper with alligator clips.

e. Connector, UG-213A/U.

4. PROCEDURES.

a. GENERAL.

(1) Set POWER switch of receiver to OFF position.

(2) Disconnect all cables at rear of equipment.

(3) Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

(4) Reconnect a-c power cable.

(5) Reconnect antenna cable to ANT. INPUT jack (J401).

(6) Plug headset into AUDIO OUTPUT jack on front panel.

WARNING

LINE VOLTAGE EXISTS ON THE REAR OF THE FRONT PANEL. TAKE ALL POSSIBLE PRECAUTIONS AND EXERCISE CARE WHILE WORKING INSIDE THE EQUIPMENT.

(7) Select proper first-oscillator crystal (V501) for the particular operating frequency desired, and insert it into crystal holder. Insert holder into octal socket in chassis. Refer to Routine 2.3(5).

b. FIRST-OSCILLATOR-SECTION TUNING.

(1) Set POWER switch to ON position.

(2) Set tuning dials of first-oscillator section to approximately the correct operating frequency. Refer to figure 2-1 for location of tuning dials.

(3) Set FUNCTION switch of electronic multimeter to —DC position, and RANGE switch to 10V position.

(4) Connect one test lead from COMMON post of electronic multimeter to receiver chassis (ground). This connection is not to be removed until the tuning adjustments are completed.

(5) Connect d-c probe of electronic multimeter to 1st TRIPL METER jack (J501), and tune 1st OSC adjustment for a peak indication on meter.

(6) Connect d-c probe of electronic multimeter to 1st AMPL METER jack (J502), and tune 1st TRIPL PLATE adjustment for a peak indication on meter.

(7) Connect d-c probe of electronic multimeter to 2nd TRIPL METER jack (J503), and tune 1st AMPL PLATE adjustment for a peak indication on meter.

(8) Connect d-c probe of electronic multimeter to 2nd AMPL METER jack (J504), and tune 2nd TRIPL PLATE adjustment for a peak indication on meter.

(9) Set 2nd AMPL PLATE adjustment to desired frequency on scale.

c. R-F-SECTION TUNING.

(1) Set tuning dials of r-f section to approximately the correct operating frequency. Refer to figure 2-1 for location of tuning dials.

(2) Connect d-c probe of electronic multimeter to junction of R325 and S303, located at bottom right front of chassis. Connect test jumper from junction of R-342, R-343 and C-331 to ground.

(3) Connect impedance-matching pad, supplied with signal generator, to CARRIER OUTPUT jack of signal generator.

(4) Adjust signal-generator controls as follows:

(a) Set POWER switch to ON position.

(b) Set EXT. PULSE switch to OFF position.

(c) Set modulation selector switch to OFF position.

(d) Set carrier output control fully counterclockwise.

(e) Rotate range knob to band F.

(f) Rotate tuning dial to receiver operating frequency.

(g) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(h) Set modulation selector switch to 1000 position.

(i) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

(5) Disconnect antenna cable at rear of receiver.

(6) Connect one end of cord CG-55B/U, supplied with signal generator, to matching pad. Connect other end of cord to ANT. INPUT jack (J401) of receiver, using connector UG-213A/U .

(7) Adjust carrier output attenuator of signal generator for a nominal output indication on electronic multimeter.

(8) Adjust tuning dial of signal generator for a maximum indication on electronic multimeter.

(9) Readjust ANT., 1st RF PLATE, 2nd RF PLATE, and 3rd RF PLATE tuning adjustments to approximately the proper operating frequency, as set on the tuning dials.

(10) Make a final adjustment of the four controls in step (9) above, as well as those listed below, by noting a peak in reading of electronic multimeter.

(a) 2nd AMPL PLATE.

(b) T301 (top slug).

(c) T301 (bottom slug).

(d) L307 (bottom slug).

GPO 814-043-5 Revised 30 January 1957

(e) Repeat steps (9) and (10).

(11) Set POWER switch to OFF position.

(12) Disconnect test equipment.

(13) Disconnect a-c power cable.

(14) Replace dust cover, and reconnect cables at rear of equipment.

d. FRONT-PANEL ADJUSTMENTS.

(1) Set POWER switch to ON position.

(2) Turn SQUELCH switch to OFF position.

(3) Turn R.F. GAIN control fully clockwise.

(4) Adjust A.F. GAIN control until either noise or a signal is heard in headset.

e. SQUELCH OPERATION.

(1) With no signal and only receiver noise coming through headset, set SQUELCH switch to ON position.

(2) Set AUDIO QUIETING DB control for 30 db of quieting.

(3) Turn R.F. GAIN control counterclockwise until no sound is heard in headset.

(4) Adjust AUDIO QUIETING DB control until noise is barely audible.

f. STOPPING THE EQUIPMENT.

(1) To stop equipment, set POWER switch to OFF position.

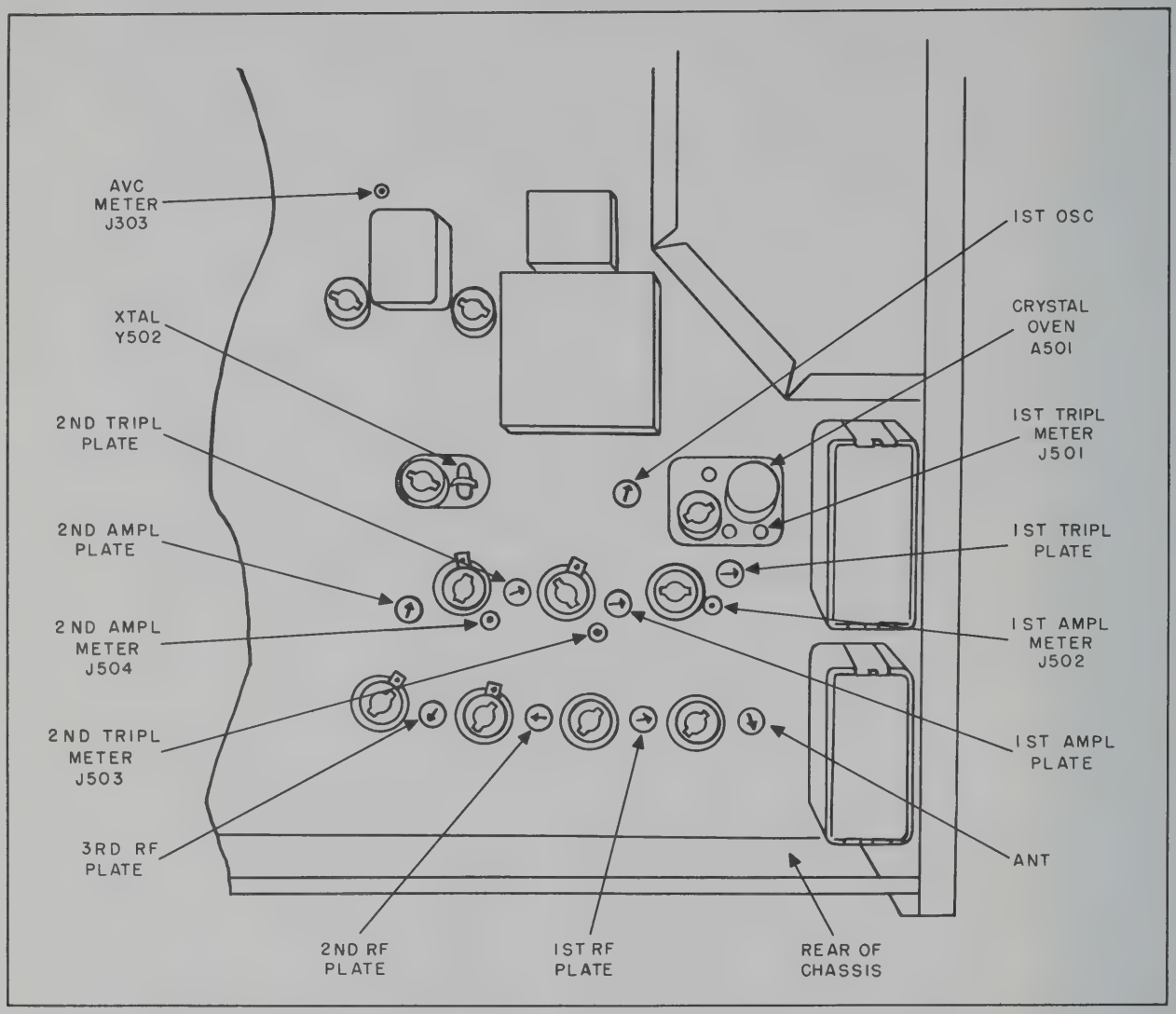

Figure 2-1. Radio Receiver R-361/GR, Oscillator and R-F Section

SERVICING PROCEDURE—I-F, A-V-C, AND SECOND-OSCILLATOR ALIGNMENT

1. GENERAL INFORMATION.

a. The purpose of this routine is to align the following stages:

(1) 6-mc intermediate frequency.

(2) Automatic volume control.

(3) Second oscillator.

b. The approximate time required for this routine is 90 minutes.

2. TEST EQUIPMENT REQUIRED.

a. Signal Generator TS-497( )/URR.

b. Electronic Multimeter TS-505/U.

3. MATERIALS REQUIRED.

a. Screwdriver.

b. Alignment tool.

c. Headset CW-49507.

d. 680-ohm, 1/2-watt resistor.

e. 1 pair of clips.

f. Test jumper with clips.

g. 0.05-μf capacitor.

4. PROCEDURES.

a. GENERAL.

(1) Set POWER switch of receiver to OFF position.

(2) Disconnect all cables at rear of equipment.

(3) Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

(4) If underside of chassis is inaccessible for meter connections, remove receiver rack mounting screws and move equipment to service bench. Set receiver upside down, with rear of chassis at front of bench.

(5) Reconnect a-c power cable.

(6) Plug headset into AUDIO OUTPUT jack on front panel.

b. 6-MC I-F ALIGNMENT.

(1) Disable a-v-c circuit by connecting jumper from junction of R342, R343, and C331, located at front bottom center of chassis, to receiver chassis (ground).

(2) Set FUNCTION switch of electronic multimeter to —DC position, and RANGE switch to 10V position.

(3) Connect d-c probe of electronic multimeter to junction between R325 and S303, located at right front of chassis.

(4) Connect another lead from COMMON post of electronic multimeter to receiver chassis (ground).

(5) Connect impedance-matching pad, supplied with signal generator, to CARRIER OUTPUT jack of signal generator.

(6) Adjust signal-generator controls as follows:

(a) Set POWER switch to ON position.

(b) Set EXT. PULSE switch to OFF position.

(c) Set modulation selector switch to OFF position.

(d) Set carrier output control fully counterclockwise.

(e) Rotate range knob to band B.

(f) Rotate tuning dial to 6 mc.

(g) Using fiducial ring, located behind carrier output attenuator, set OUTPUT meter pointer to red line.

(h) Set modulation selector switch to 1000 position.

(i) Adjust PERCENT MOD. knob until PERCENT MODULATION meter reads 30.

(7) Connect signal generator as follows:

(a) Connect plug connector end of Radio Frequency Cable Assembly CG-683/U, supplied with signal generator, to matching pad.

(b) Connect GND. binding post of cable CG-683/U, using as short a test lead as possible, to receiver chassis (ground).

(c) Connect a 0.05-μf capacitor to positive binding post of cable CG-683/U, using as short a lead as possible.

(d) Connect other end of 0.05-μf capacitor, using as short a lead as possible, to center tab of C351, located at right rear of chassis.

(8) Set R.F. GAIN control of receiver fully clockwise.

(9) To adjust T303, proceed as follows:

(a) Solder or clip 680-ohm resistor across secondary (see figure 2-2).

(b) Set POWER switch of receiver to ON position. Allow equipment to warm up for at least five minutes before making any tests.

(c) Adjust carrier output attenuator of signal generator for a nominal output indication on electronic multimeter.

(d) Tune the primary slug (on bottom of shield can) for maximum indication on electronic multimeter.

(e) Set receiver POWER switch to OFF position.

(f) Remove 680-ohm resistor.

(g) Solder or clip 680-ohm resistor across primary.

(h) Set POWER switch to ON position.

(i) Tune secondary slug (on top of chassis) for a peak indication on electronic multimeter.

(j) Set receiver POWER switch to OFF position.

(k) Remove 680-ohm resistor.

(10) To adjust T304, repeat procedure in steps (9) (a) through (k), above.

(11) To adjust T305, repeat procedure in steps (9) (a) through (k), above.

(12) To adjust T306, repeat procedure in steps (9) (a) through (k), above.

c. A-V-C ALIGNMENT.

(1) Remove a-v-c short, and connect d-c probe of electronic multimeter to AVC METER jack (J303), at top front of chassis.

(2) Allow signal generator to remain as above.

(3) Set POWER switch to ON position.

(4) Tune slug on T302 (at bottom of chassis) for a peak indication on electronic multimeter.

(5) Set POWER switch to OFF position.

(6) Disconnect test equipment.

d. SECOND-OSCILLATOR ALIGNMENT.

(1) Connect d-c probe of electronic multimeter to pin 1 of V301, located at bottom right rear of chassis.

(2) Connect another test lead from COMMON post of electronic multimeter to receiver chassis (ground).

(3) Set POWER switch to ON position.

(4) Tune 2nd OSC TUNING control for a peak indication on electronic multimeter.

(5) Set POWER switch to OFF position.

(6) Disconnect test leads of electronic multimeter.

(7) Disconnect a-c power cable.

(8) Replace dust cover, remount receiver in rack, and reconnect cables at rear of equipment.

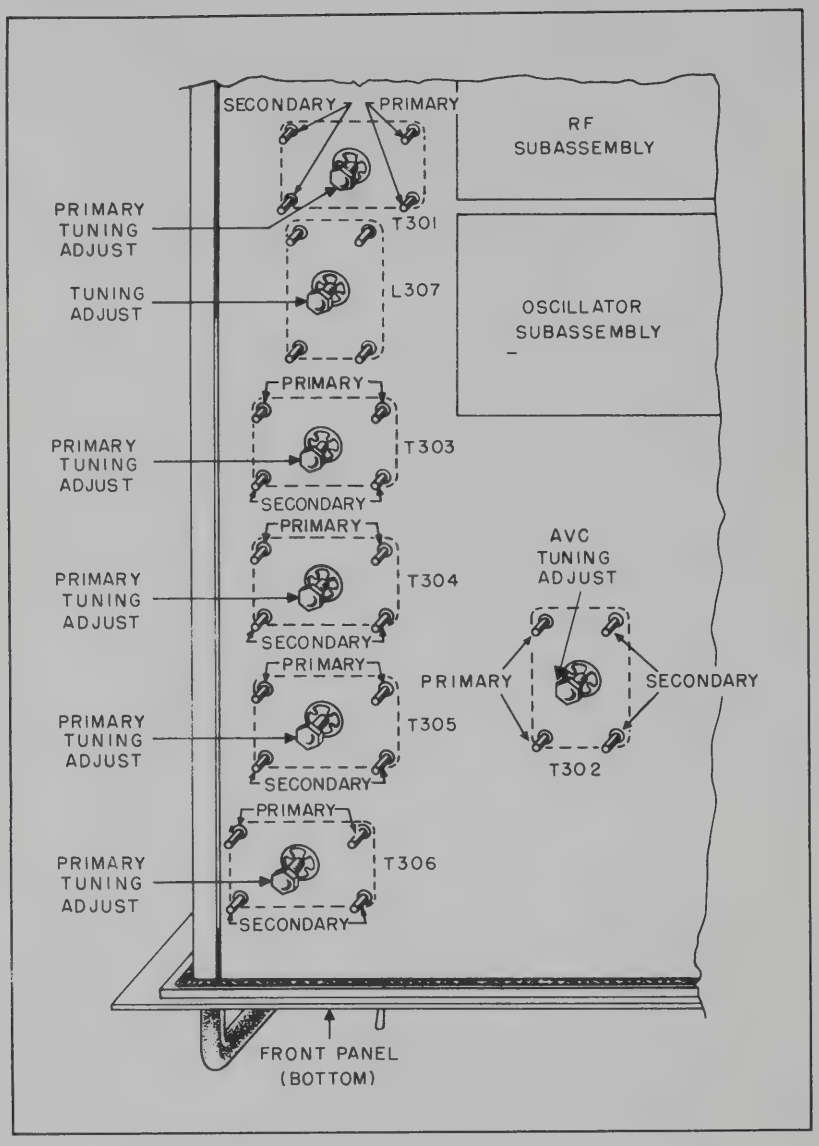

Figure 2-2. Radio Receiver R-361/GR, Bottom View, Showing I-F and A-V-C Tuning Adjustments

SERVICING PROCEDURE—CRYSTALS

1. GENERAL INFORMATION.

a. The purpose of this routine is as follows:

(1) To calculate Y501 crystal frequency required for a given channel frequency.

(2) To give correct procedure for placement of crystal into oven.

(3) To give method of checking crystals.

b. The approximate time required for this routine is 40 minutes.

2. TEST EQUIPMENT REQUIRED.

a. None.

3. MATERIALS REQUIRED.

a. Screwdriver.

4. PROCEDURES.

a. CALCULATING CRYSTAL FREQUENCY OF Y501.

(1) The crystal frequency required for a given channel frequency is found by applying the following equation:

crystal frequency (mc) = 1/9 (channel frequency (mc) — 40.4 mc).

(2) Sample calculation: Assume that the receiver is required to receive a channel frequency of 260.2 mc. Applying the equation given above, and substituting the values given:

Crystal frequency = 1/9 (260.2 — 40.4)

$$= \frac{219.8}{9}$$

= 24.422222 mc

b. PLACEMENT OF CRYSTAL INTO OVEN.

(1) Set POWER switch of receiver to OFF position.

(2) Disconnect cables at rear of equipment.

(3) Remove dust cover. The dust cover is secured by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

(4) Locate crystal oven A501 in oscillator section.

(5) Remove oven from chassis.

(6) Remove the three screws at bottom of oven.

(7) Hold base of oven with one hand, and pull off cover with the other hand; see figure 2-3.

(8) Grasp black bakelite base of heating element and thermostat assembly, and pull straight out; an HC-6/U type crystal holder is now exposed and may be removed.

(9) Insert crystal into crystal holder.

(10) Align the three pins on base with the three openings on heating element and thermostat assembly.

(11) Press cover closed and replace the three screws. Before securing screws, make certain that cover is aligned with base, to prevent damage to threads.

(12) Insert oven into chassis.

(13) Replace dust cover, and reconnect cables at rear of equipment.

c. METHOD OF CHECKING CRYSTALS.

(1) There are two crystals in the equipment, Y501 and Y502. Both crystals are located in the oscillator section and may be checked by utilizing the procedure as described in Routine 2.1(5), First Oscillator Section Tuning, and Routine 2.2(5), Second Oscillator Alignment, and observing a peak indication on the electronic multimeter.

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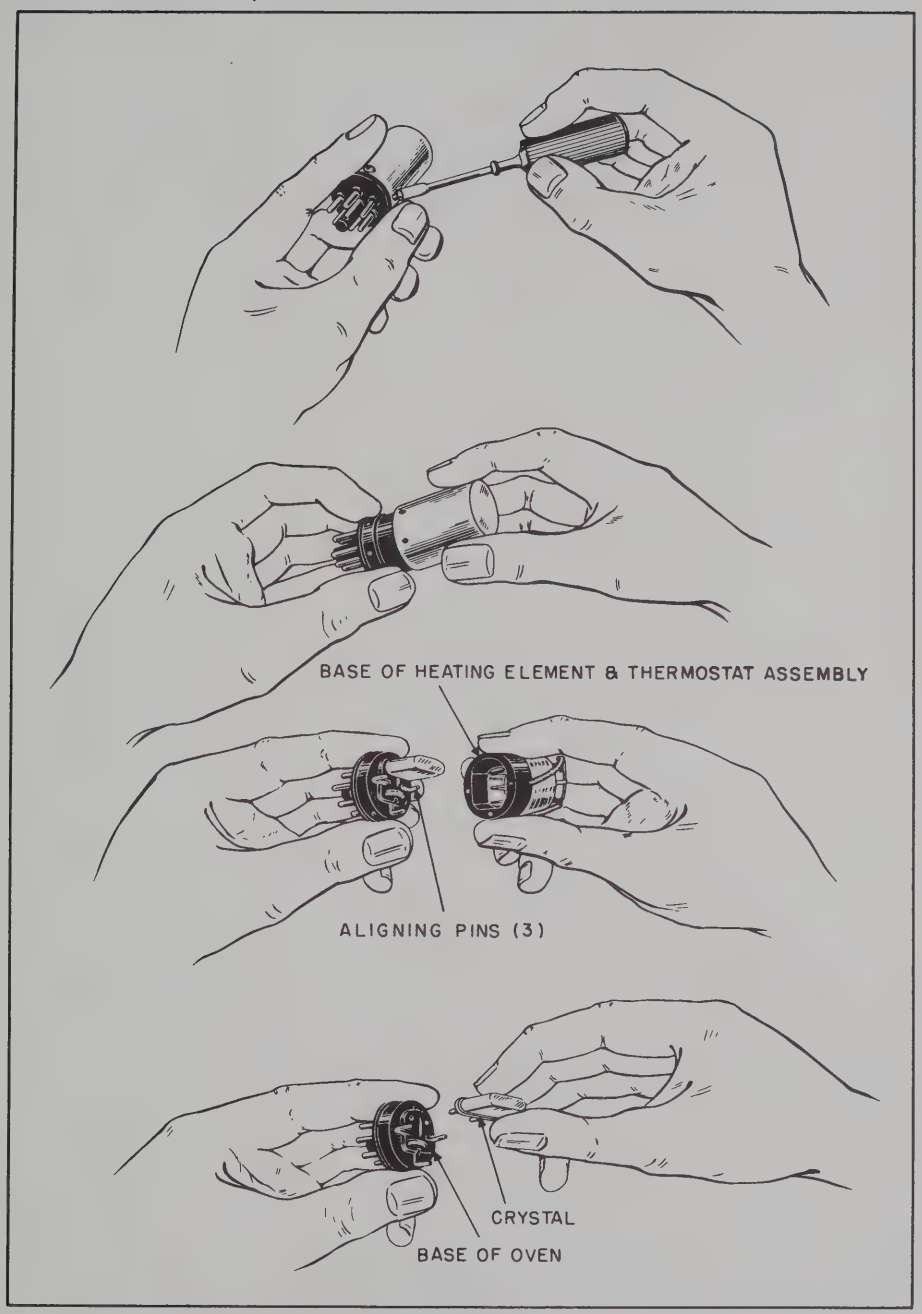


Figure 2-3. Radio Receiver R-361/GR, Crystal Y501 and Oven A501 Assembly

CLEANING, INSPECTING, AND LUBRICATING—CLEANING AND INSPECTION OF RADIO RECEIVER R-361/GR

1. GENERAL INFORMATION.

a. The purpose of the following routine is to accomplish a complete cleaning and inspection of the receiver.

b. The approximate time required for this routine is 45 minutes.

c. Report all defective items to the maintenance supervisor to determine whether replacement or repair is required.

2. TEST EQUIPMENT REQUIRED.

a. None.

3. MATERIALS REQUIRED.

a. Clean rags.

b. Approved cleaning solvent.

c. Dust brush.

d. Screwdriver.

e. Vacuum cleaner.

f. Crocus cloth.

4. PROCEDURES.

a. REMOVAL AND DISASSEMBLY.

(1) Set POWER switch of receiver to OFF position.

(2) Disconnect all cables at rear of equipment.

(3) Remove dust cover. The dust cover is secured at the rear by four fasteners, which may be released by pressing in and rotating 1/4 turn counterclockwise.

(4) Remove receiver rack mounting screws and move equipment to service bench.

(5) Remove r-f subassembly and oscillator subassembly cover plates.

b. CLEANING.

CAUTION

During the cleaning operation do not disturb alignment or tuning adjustments. Do not move the leads about or touch any of the r-f coils or trimmer capacitors.

(1) Using dust brush and vacuum cleaner, clean all components on top and bottom of chassis.

(2) Moisten cloth with approved cleaning solvent and wipe clean any grease or oil-stained areas.

(3) Using solvent-moistened cloth, wipe down front panel and control knobs; then dry with a clean, non-linting cloth.

(4) Remove jewel bezel of indicator light. Wipe interior surfaces and replace.

(5) Check MFP (moisture-fungus proof) coatings; remove rust if necessary, and retouch with TUF-ON-74 MFD varnish or equivalent.

(6) Using solvent-moistened cloth, wipe down interior and exterior surfaces of dust cover. Wipe dry with clean, non-linting cloth.

(7) Using crocus cloth, burnish contacts at each end of interconnecting cables.

c. INSPECTING.

(1) Inspect all nuts, bolts, and screws for tightness; tighten where necessary.

(2) Inspect all wiring leads to terminals for corrosion or loose mechanical connections.

(3) Check variable capacitors of U401, U402, U403, U404, U501, and U502 and variable capacitors C501, C502, and C503 for dirt, corrosion, and bent plates.

(4) Examine resistors and capacitors for discoloration, cracks, and blistering.

(5) Examine transformers and chokes for discoloration.

(6) Remove front-panel fuse and check for correct rating. Burnish contact surfaces.

(7) Inspect all control knobs for binding, misalignment, and loose setscrews.

(8) Inspect antenna for corrosion, loose fittings, or damaged insulators and reflectors.

(9) Replace dust cover on receiver. Remount receiver in rack and reconnect cables.

CLEANING, INSPECTING, AND LUBRICATING -- CLEANING AND INSPECTION OF ANTENNA ASSEMBLY AT-197/GR

1. GENERAL INFORMATION.

a. The purpose of the following routine is to accomplish a complete cleaning and inspection of the antenna assembly.

b. The approximate time required for this routine is 90 minutes.

c. Report all defective items to the maintenance supervisor for replacement.

2. TEST EQUIPMENT REQUIRED.

a. None.

3. MATERIALS REQUIRED.

a. Clean rags.

b. Approved cleaning solvent.

c. Screwdriver.

d. Dow-Corning DC-4 silicone lubricant.

e. Anti-seize compound (MIL-C-25681).

4. PROCEDURES. (See figure 3-1.)

a. REMOVAL AND DISASSEMBLY.

(1) Disconnect Antenna Assembly AT-197/GR by unplugging the UG-333/U jack (type HN) at the bottom of the cable assembly (29).

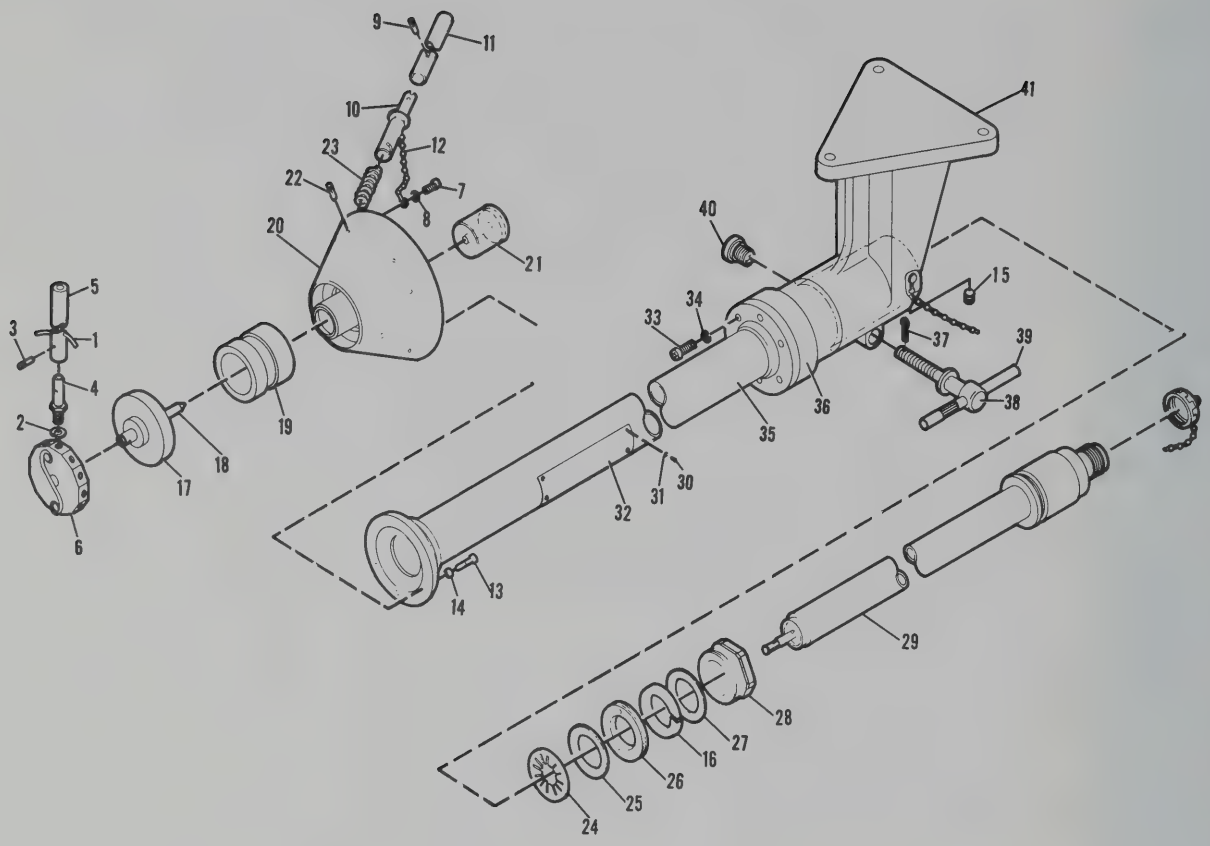
(2) Dismount the antenna assembly from the mast, pole, or other attachment, by removing the attaching hardware from the three mounting holes of the antenna coupling (40).

(3) Disassemble the antenna assembly in the order of the index numbers appearing in figure 3-1. Observe the following:

(a) To disconnect the antenna assembly head, lay the antenna assembly on its side and draw the head far enough away from the antenna support coupling tube (35) to expose the armor nut (28). Unscrew the armor nut so that the washer (27) and the neoprene gasket (16) slide out of the bottom of the lower head (20). Expose the bottom of the spanner nut (26) by twisting off the gasket from around the cable assembly (29). Unscrew the spanner nut and lift off the antenna head assembly.

CAUTION

Before performing the operation in step (a), make certain that the dust cap is screwed onto the cable assembly plug, and handle the antenna carefully, so the cable assembly will not slip out of the mast or be damaged.



1 Wire
2 Lockwasher
3 Groove pin
4 Upper radiator insert
5 Upper radiator tube
6 Upper radiator assembly cap
7 Screw
8 Lockwasher
9 Groove pin
10 Dzus stud
11 Lower radiator tube
12 Chain
13 Screw
14 Washer
15 Screw
16 Gasket
17 Upper head assembly
18 Contact pin
19 Glass insulator
20 Lower head
21 Antenna insulator
22 Groove pin
23 Spring
24 Clamp
25 Washer
26 Spanner nut
27 Washer
28 Armor nut
29 Cable assembly
30 Screw
31 Lockwasher
32 Nameplate
33 Screw
34 Lockwasher
35 Support tube
36 Coupling seat assembly
37 Cotter pin
38 Bolt
39 Handle
40 Insert
41 Antenna coupling

Figure 3-1. Antenna Assembly AT-197/GR, Exploded View

(b) Unless necessary, remove the antenna assembly head in one piece, without breaking the solder connections between the glass insulator (19), the upper head assembly (17), and the lower head (20). Likewise, do not break the silver solder joint between the contact pin (18) and the upper head assembly (17) unless necessary. If the joint is broken in either case, be sure to remove all old solder before making a new joint (step c).

(c) Before attempting to slide washer (25), the spanner nut (26), washer (27), and the armor nut (28) off the top of the cable assembly (29) be sure to fold up the exposed tip of copper braid at the top of the cable assembly.

(d) Make sure that the dust cap has been unscrewed from the cable plug before attempting to slide the cable assembly (29) out of the bottom of the mast.

CAUTION

Be careful not to accidentally break the solder joint between the inner conductor and the contact spring at the top of the cable assembly (29).

(e) Loosen the handle assembly before removing the coupling seat assembly (36) from the antenna coupling assembly.

b. INSPECTION AND CLEANING.

(1) Check the outer conductor of copper braid at the top of the cable assembly (29) for corrosion. Clean if necessary.

(2) Inspect and if necessary clean or replace the contact pin (18), the glass insulator (19), the antenna insulator (21), the neoprene gasket (16), or the contact spring at the top of the cable assembly (29).

(3) Clean and lubricate the Dzus stud brazed to the top of the upper head assembly (17) and the Dzus studs (10) pinned to the tops of the lower radiator assemblies. Use Dow-Corning DC-4 silicone lubricant unless otherwise instructed.

(4) Clean threads of the following to remove foreign particles which may cause corrosion or impede assembly: upper radiator inserts (4), screws (13, 30, 33, 34), groove pins (9 and 22), handle assembly (38 and 40), dust cap and connector at bottom of cable assembly (29), spanner nut (26), and armor nut (28).

(5) If joints are to be resoldered, clean away all traces of old solder. Resolder as indicated in step c.

(6) Check that fingers of clamp (24) are evenly spread.

(7) Check that gasket (16) lies flat and has not been twisted out of shape.

(8) Check that coaxial cable to be installed in antenna assembly is in working condition.

(9) Check that chain securing dust cap is in working condition; likewise, check bead chains (12) securing the 12 lower radiator tubes to the lower head (20).

(10) Place anti-seize compound (MIL-C-25681) between the contact surfaces of antenna support assembly and antenna coupling assembly.

c. REASSEMBLY.

(1) Secure the nameplate (32) to the antenna support assembly tube (35) with four screws and lockwashers (30 and 31).

NOTE

Be sure the nameplate is positioned to read from the bottom up.

(2) Examine the cable assembly (29). If the solder joint between the contact spring and the inner conductor at the top of the assembly has been broken, remove all old solder; then, rejoin by dropping fresh solder into the 1/16-inch diameter holes of the spring.

(3) Insert the cable assembly (29) into the lower end of the antenna support assembly tube (35) so that the cable assembly contact spring is at the top of the tube and the cable assembly plug is at the bottom of the tube. The bottom and top are easily distinguished by the fact that the nameplate (32) is nearer the top.

CAUTION

After inserting the cable assembly (29), lay the tube on its side. Do not stand it up, or the cable assembly may slide out and be damaged.

(4) If the antenna assembly head has been dismantled, reassemble as indicated in steps (5) through (8). Otherwise, proceed directly to step (9).

(5) Lock the springs (23) into the lower head (20) with groove pins (22).

(6) Resolder the contact pin (18) to the bottom of the upper head assembly (17) with a minimum of silver solder.

(7) Seat the glass insulator (19) in the top of the lower head (20). Then position the upper head assembly (17) on top of the insulator.

(8) Solder the three parts together around the top and bottom of the glass insulator (19). Use 50/50 solder and a minimum of rosin flux. Apply heat to the metal parts only, and use only enough heat to flow the solder.

CAUTION

Heat evenly and do not overheat.

(9) Insert the antenna insulator (21) into the bottom of the lower head (20) as shown in the figure. Lay the antenna assembly head aside.

(10) Place one hand around the cable and top of the tube, to brace the cable. With the other hand, slide the following parts in order over the top end of the cable: the armor nut (28), washer (27), the spanner nut (26), washer (25), and the clamp (24). Fold down the copper braid 3/16 inch between the clamp (24) and washer (25).

(11) Insert the top of the cable assembly (29), the assembled fittings (24 through 28), and the antenna support assembly tube (35) through the bottom of the lower head (20).

CAUTION

Make sure the contact spring at the top of the cable assembly (29) slides into the channel of the antenna insulator (21).

(12) Screw the spanner nut (26) into place inside the lower head (20), tightening the copper braid between the clamp (24) and the washer (25).

(13) Install the neoprene gasket (16) over the cable flush between the spanner nut (26) and washer (27).

(14) Screw the armor nut (28) tightly against the washer (27).

(15) Lock the top of the antenna support assembly tube (35) to the bottom of the lower head (20) with six screws and lockwashers (13 and 14). Then lock the bottom of the tube to the top of the coupling seat assembly (36) with six more screws and lockwashers (33 and 34).

(16) Secure the cable assembly (29) in place by positioning the two set screws (15) against the flats of the cable plug at the bottom of the assembly. Screw the dust cap off the seat assembly coupling (36) onto the cable assembly plug.

(17) Thread the insert (40) into the proper hole of the neck of the antenna coupling (41).

NOTE

There are two holes in the coupling neck. Since both are machined differently, the hole which the insert fits is the correct one.

(18) Prepare the handle assembly by slipping the handle (39) through the eye of the bolt (38). Then thread the assembly into the neck, starting at the hole opposite the insert hole (step (17)). Insert the cotter pin (37) into the bolt (38) as shown, and then spread the pin.

(19) Insert the seat assembly coupling (36) into the antenna coupling (41), and secure by tightening the handle assembly (38 and 39).

(20) Slip the large lugs of the bead chains (12) over the necks of the Dzus studs (10). Join the studs to the lower radiator tubes (11) with groove pins (9). Secure the radiator assemblies to the lower head (20) by inserting their stud ends (10) into the radiator head holes. Twist each assembly 1/4 turn clockwise as its stud cam slot advances to the groove pin (22). Use enough force to overcome the spring (23) retained within each hole.

(21) Rechain the lower radiator assemblies to the lower head (20) by securing the free lugs of the chains (12) to the head with screws and lockwashers (7 and 8).

(22) Pin the 12 upper radiator tubes (5) and upper radiator inserts (4) with 24 groove pins (3). Then thread the 12 inserts into the upper assembly radiator cap (6) with 12 lockwashers (2). Thread the lockwire (1) through the holes in the tubes, and tie the ends together.

(23) Attach to the upper radiator assembly head as follows:

(a) Grasp the radiator cap upper assembly (6) of the upper radiator assembly with one hand.

(b) With the other hand, grasp the mast.

(c) Snap the upper radiator assembly onto the top of the mast by giving the assembly a 1/4 turn clockwise. The Dzus stud brazed to the top of the upper head assembly (17) should engage the Dzus spring riveted to the top of the radiator cap upper assembly (6).

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